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NO. 6

ORIGINAL ARTICLES

THE CLASSIFICATION OF DENTO-FACIAL DEFORMITIES.*

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ORTHODONTIC art has made considerable progress in recent years, and has realized a record of which we may feel justly proud. So many factors have contributed to its advancement that an analysis and appraisal of them would in itself be highly instructive. The relative value of each of the contributing factors has not yet been determined, but it may safely be stated at this time that the core of what, for want of a better term, we have called the "new movement" in orthodontic thought, consists in *the comprehension of the importance of a differential diagnosis, the designing of a definite treatment for each type of malocclusion so comprehended, and the mastery and simplification of every such definite treatment.*

In other words, the application of the scientific method to the many problems which confronted us on every side has at last brought forth a clarification of them, has established sundry fundamental conceptions for our guidance in practice. Advances in appliance design and construction, refinements in the technical details of treatment, progress in the principles of post-treatment maintenance—all these are worthy ends for research. But more fundamental and far-reaching than any or all of these—a problem of prior claim—is the art and difficulty of making a correct diagnosis.

1. Diagnosis Defined.

Diagnosis has been defined as "the art of discriminating between diseases or deformities, and distinguishing them by their characteristic signs and symptoms". Broadly interpreted, every diagnosis implies a consideration of such general conditions as age and health, the relative degree of growth and development, and a recognition of the causative factors.

But custom limits the use of the term to the mere act of determining the nature of the abnormality. Thus, *an orthodontic diagnosis may be said to embrace the determination of the particular type of malocclusion, the degree*

*Read before the Alumni Meeting of the Dewey School of Orthodontia, Kansas City, Mo., Feb. 26, 1915.

of facial deformity associated therewith, and the recognition of such other abnormalities as may complicate the same, or stand in causal relation thereto.

2. Historical.

Malocclusion of the teeth presents itself in an almost endless variety of forms, and for many years it was an accepted doctrine that their classification constituted a hopeless task. In "the good old days" when our art was still in its infancy every case constituted a law unto itself, and many practitioners of experience could boast of a large "assortment" of forms. Fortunately, numerous investigators were not similarly minded, but endeavored to bring order into this apparent confusion, to detect similarity in so vast a number of deviations from normality. They early realized that *a comprehensive classification constitutes the first step in the difficult art of diagnosis*, and hence devised various systems for this purpose.

The first attempt at classification of which we have any record was made by the German dentist F. C. Kneisel,¹ who proposed the two groups: *partial* and *complete*. By the term *partial* he meant malposition of individual teeth, and he speaks of teeth occupying positions labial, mesial, or distal to normal. The group of abnormalities embraced under the term *complete*, he subdivided into:

- (a) Cases which we recognize as a distal relation of the lower arch.
- (b) Cases which we recognize as a mesial relation of the lower arch.
- (c) Cases which he said presented an "edge to edge bite".

Many other classifications have been suggested since Kneisel's time, but I can here merely mention those which were based (at least to some extent) upon the morbid anatomy of the various forms of malocclusion. Other efforts at conceptual shorthand were largely based upon the treatment to be instituted and were, needless to state, fallacious.

The most important of the former group, those which actually marked a definite step toward that ideal scheme which we ultimately hope to adopt, were by the following writers: Carabelli,² Magitot,³ Iszlai,⁴ Sternfeld,⁵ Angle,⁶ Welcker,⁷ Grevers,⁸ Herbst,⁹ Zsigmondy,¹⁰ and Villain.¹¹

It is not my intention, in the present instance, to critically review the scheme of each of the above; lack of space forbids that. Hence I append a brief bibliography for the reader's guidance.

A careful study of the works referred to, a clinical practice extending over sixteen years, as well as discussions and correspondence with practitioners of wider experience and of recognized ability in the art of observation, have compelled the writer to formulate conclusions on this important topic which are at variance with numerous texts of our day, and with the opinions of men he has long since learned to respect.

*"But the best courage man has ever shown
Is daring to cut loose and to think alone."*

Not one of the schemes alluded to above has gained universal acceptance; and universal acceptance is an indispensable characteristic of any statement of fact. The language of science, like of art, is international. Failure to gain common acknowledgment, especially in this instance, is due to one of the following causes.

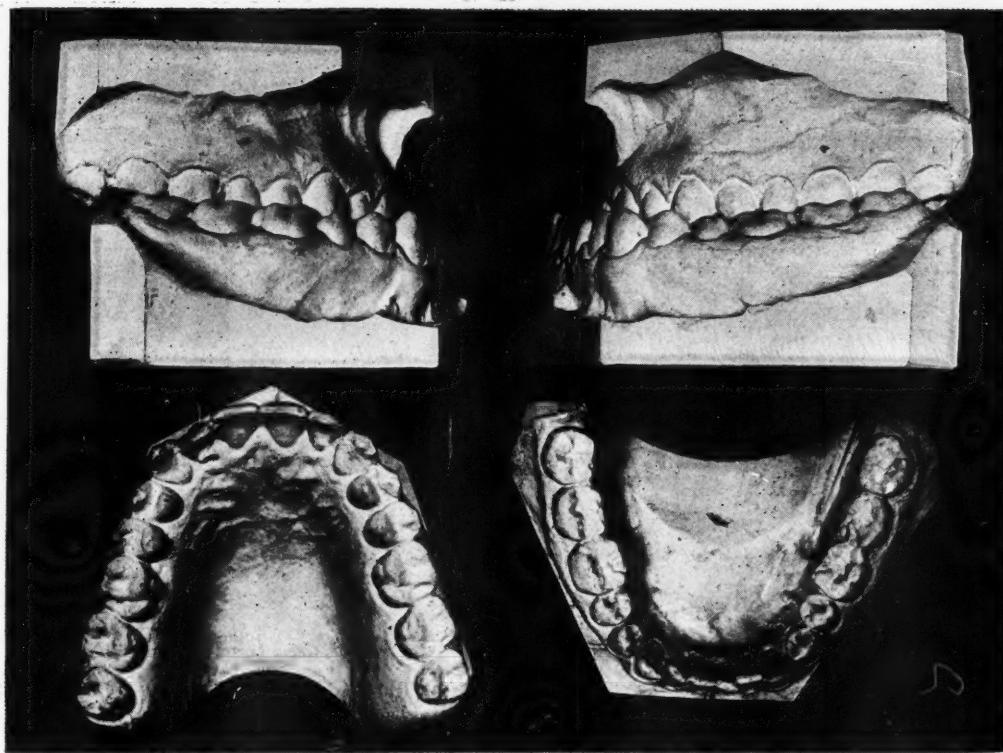


Fig. 1.—*Mandibular macroglossia.* Note the symmetrical, well developed upper arch; the bilateral mesioclusion is merely a symptom of the lower jaw deformity.



Fig. 2.—Profile of case shown in Fig. 1. The mandible is too long and its angle too obtuse.

First, a classification may lack comprehensiveness. This is a common fault. It may fail to emphasize, or recognize, certain pathological states commonly found in dento-facial deformities; or fail to provide a rational terminology.

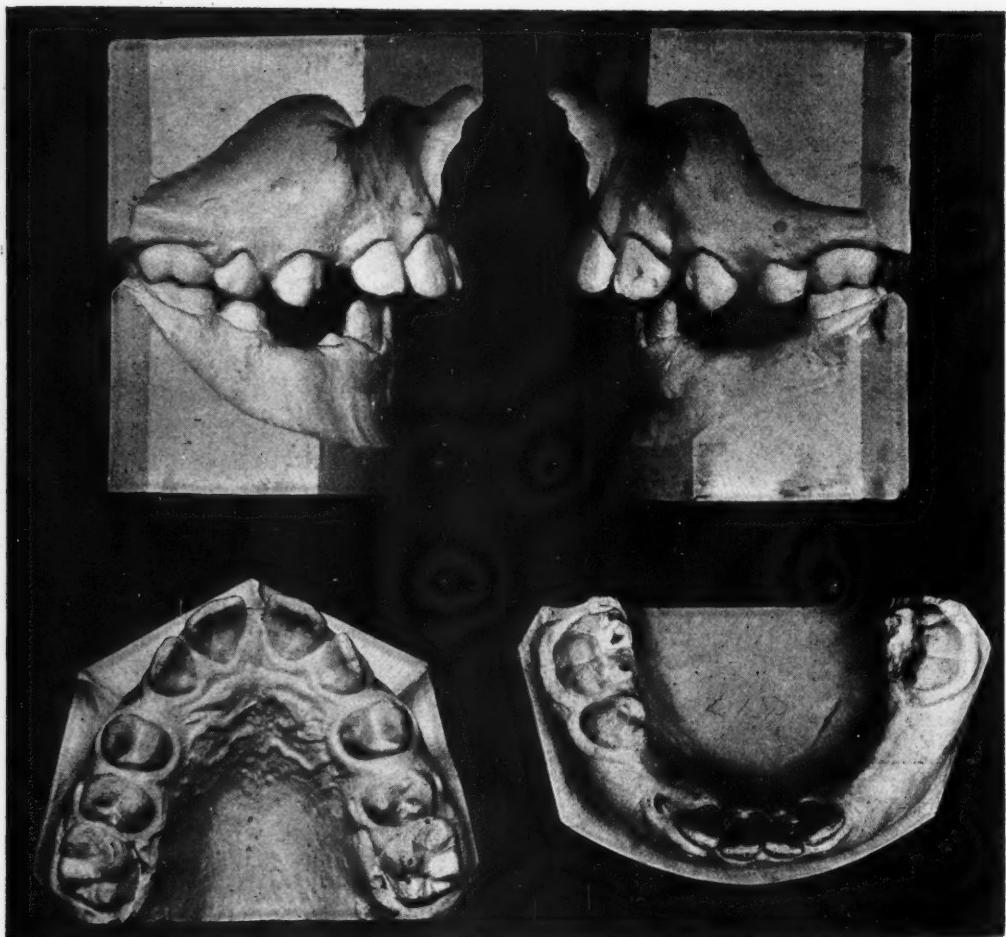


Fig. 3.—*Mandibular micrognathia.* Note the torso-linguoversion of the upper lateral incisors, encroaching on the cupid spaces. The upper incisors are not in labioversion.



Fig. 4.—Profile of case shown in Fig. 3. The mandible is too short in body and rami.

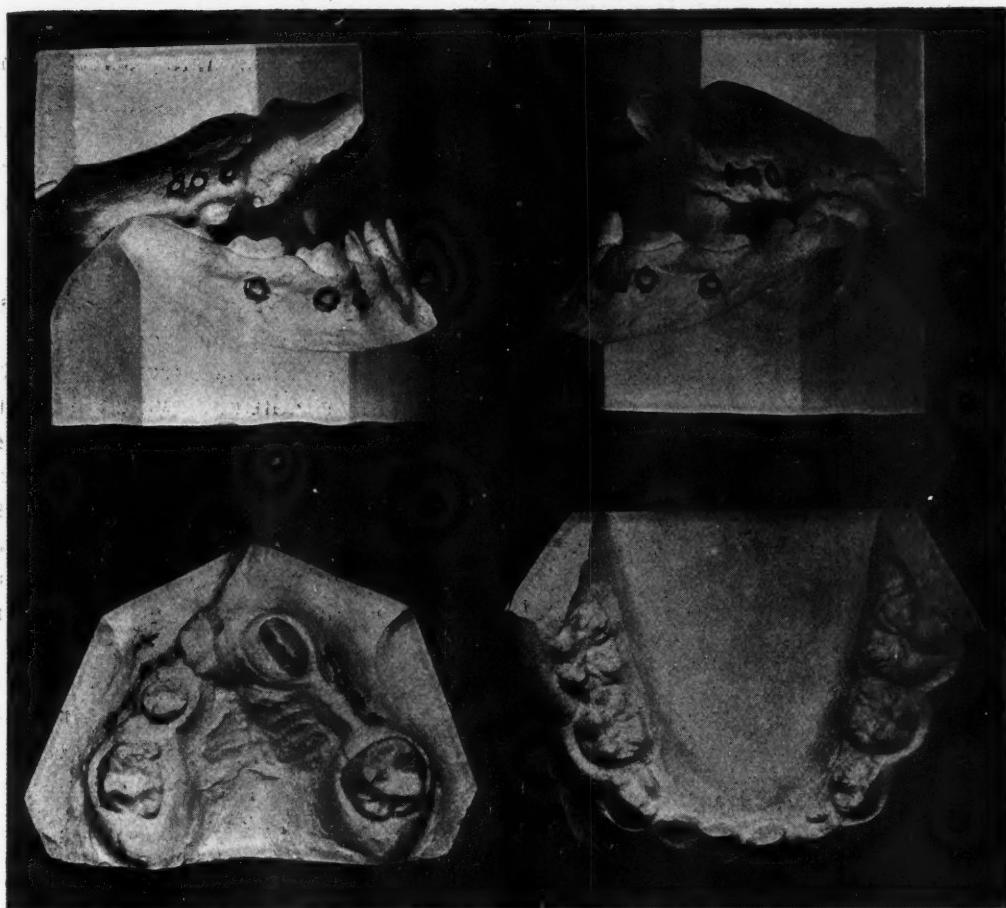


Fig. 5.—*Maxillary micrognathia.* Note the marked arrest of development, complicated by deficiency in the number of teeth.



Fig. 6.—Profile of case shown in Fig. 5.

Second, it may be too comprehensive, i.e., lay too much stress upon details, particularly in terminology.

Third, there has never been an organized, cooperative, constructive movement (until a year or so ago)¹² which had for its object the drafting of a comprehensive scheme, including a rational terminology.

3. Differentiation of the Various Forms of Malocclusion.

Before proceeding with a classification which will meet present-day requirements, it might be well to first ask ourselves: What morbid conditions usually enter into malocclusions? The answer to this question must be stated as follows: There are four fundamental conditions which conjoin in malocclusion—conditions so elementary that most writers now recognize their basic significance—and each one of these conditions may manifest itself in varying degrees of deviation and again be further classified into more elementary divisions, or be complicated by secondary deviations. Concisely expressed, these four conditions are: Malformations of the jaws and their processes, malpositions of the mandible, malrelations of the dental arches and malpositions of the teeth.

In addition to these, we find anomalies of form, number and eruption of the teeth, abnormalities of the nasal tract and accessory sinuses; abnormal breathing; deformities and malrelations of the lips and facial expression; interferences with normal articulation in speech; anomalies of the temporo-mandibular articulation; and abnormal developments and functions of the tongue and general facial musculature, etc. But let us first consider the four primary groups of deviations enumerated above.

Malformations of the jaws are the most serious conditions we have to deal with; at times we meet with such extreme deformity that its correction lies outside of our domain.¹³ Now, when a case presents a pronounced malformation of one or both jaws it is the very acme of unreasonableness to ignore it. A recent writer¹⁴ has advanced the argument that malformations of this kind are the result of malocclusion and not the cause of it, and tacitly claims that the treatment of the latter will result in a cure of the former.

But even if we admit this as a fact (which I am not ready to do), let us not forget that we are not now considering etiology. We are now critically considering certain phases of the morbid anatomy of dento-facial deformities. I will readily grant that in a large number of cases (but not all¹⁵), if the treatment is instituted early enough and we succeed in establishing normal dental function, the menacing deformity beyond the teeth and their immediate alveoli may readily be aborted. But what of the cases which come to us after the developmental period?

If we could remove all of the soft, overlying tissues from the mandible in a case exhibiting over-development and expose it to full view, there can be no doubt that the general deformity of this bone, and not the superimposed teeth and their occlusion, would attract our first attention (Figs. 1 and 2). And as we ponder over it, how futile all orthodontic efforts at correction seem, especially if they blindly, or deliberately (?) ignore this foundation.

Now it is obvious that malformations of the jaws may express themselves in several ways, hence it becomes desirable to enumerate the various

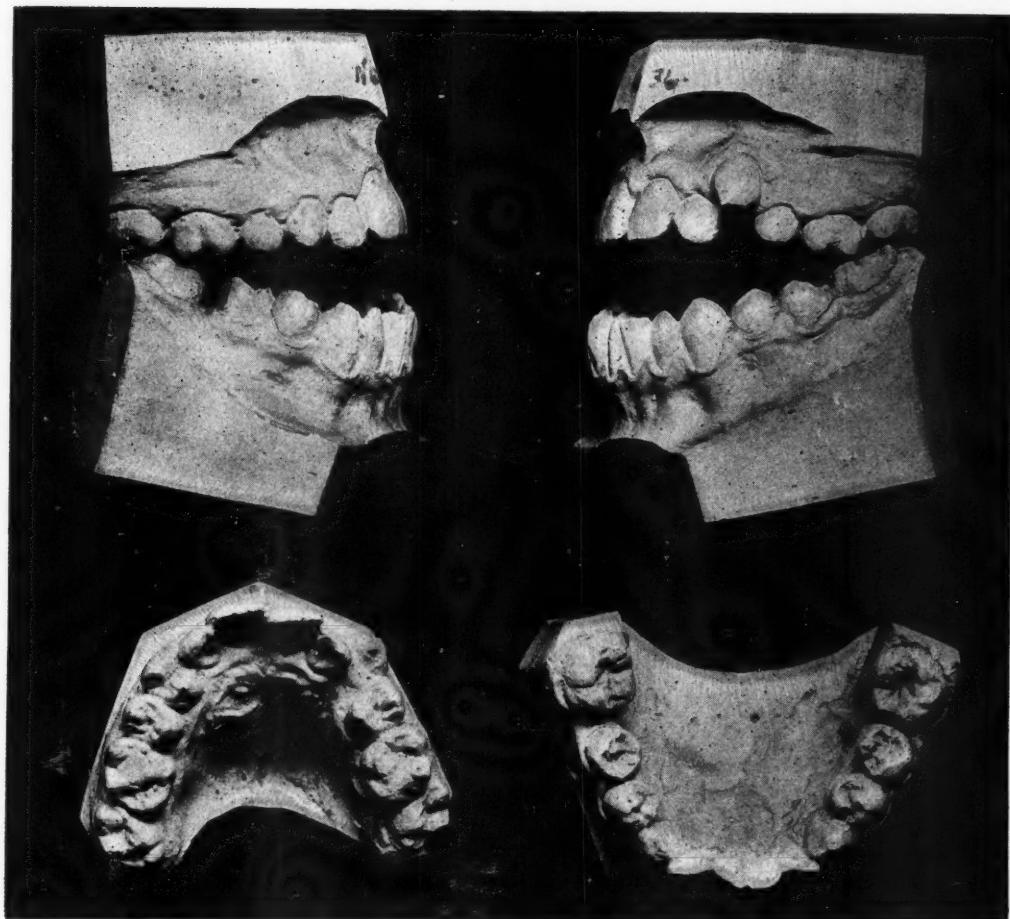


Fig. 7.—*Mandibular curvature.*



Fig. 8.—*Profile of case shown in Fig. 7.*

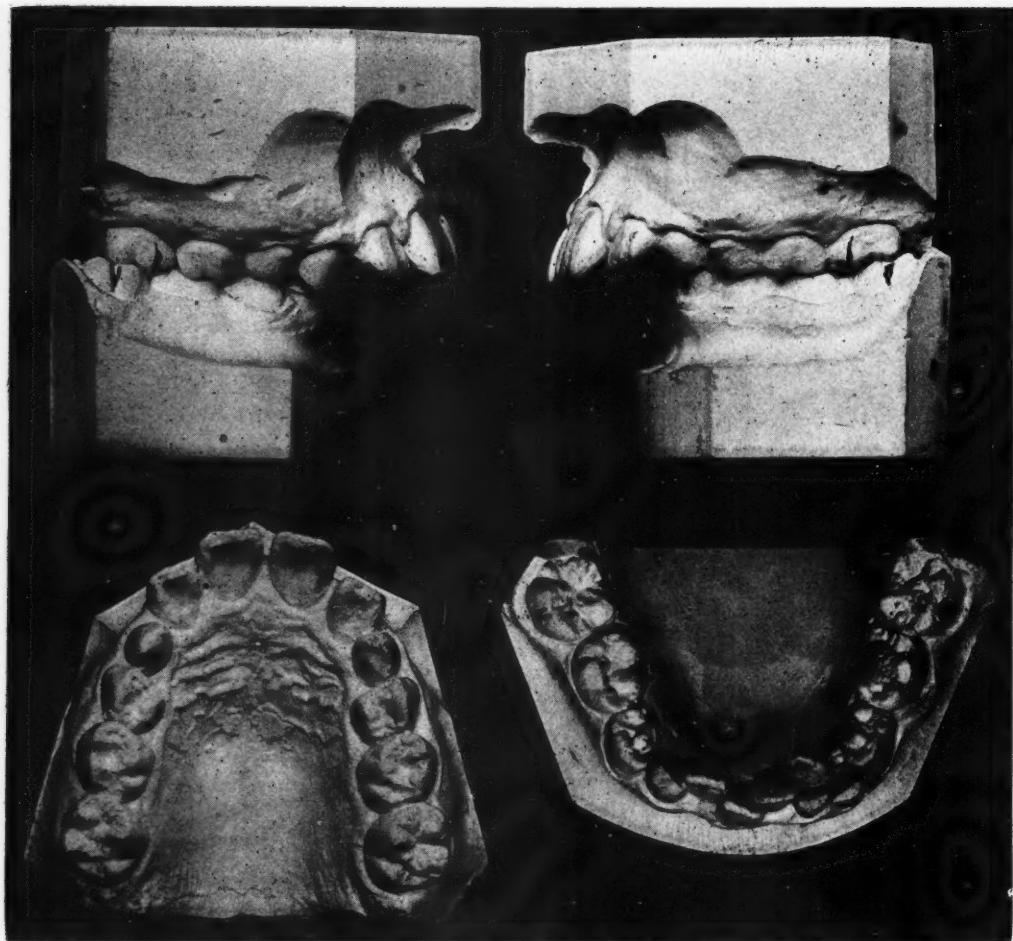


Fig. 9.—*Mandibular retroversion.* The bilateral distocclusion is merely a symptom.



Fig. 10.—Profile of case shown in Fig. 9.

kinds and to adopt a satisfactory terminology. Medical literature has frequently furnished reports of cases of congenital jaw deformities, and made use of such terms as polygnathia, hypognathia, epignathia and agnathia. And continental European dental writers have used the ending *gnathia* (meaning jaw) quite liberally, so that it is not new in dental literature, e.g., prognathia. The writer, therefore, suggests its general adoption in this connection.

Deformities of the jaws may present themselves as over-developments, for which the term *macrognathia* serves admirably; or they may express themselves in arrested developments, in which case the term *micrognathia*

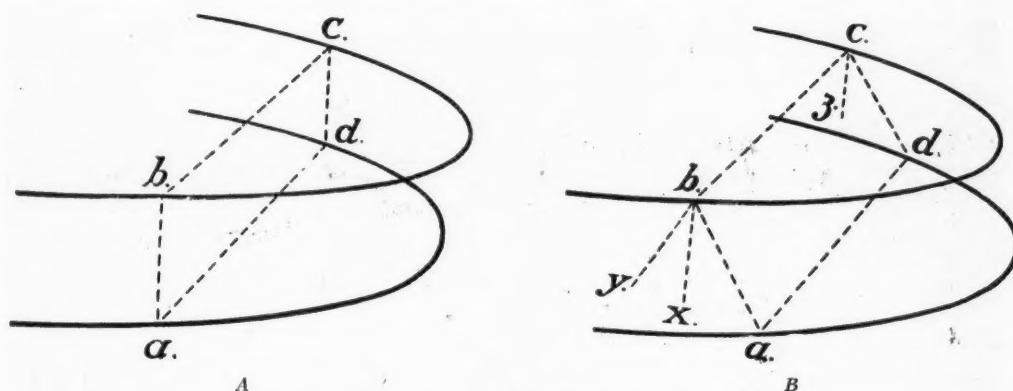


Fig. 11.—Diagram A illustrates normal arch relationship. In Diagram B, the parallelogram a, b, c, d , illustrates arch mal-relation in bilateral mesioclusion, and b, y , their relation in bilateral distoclusion.

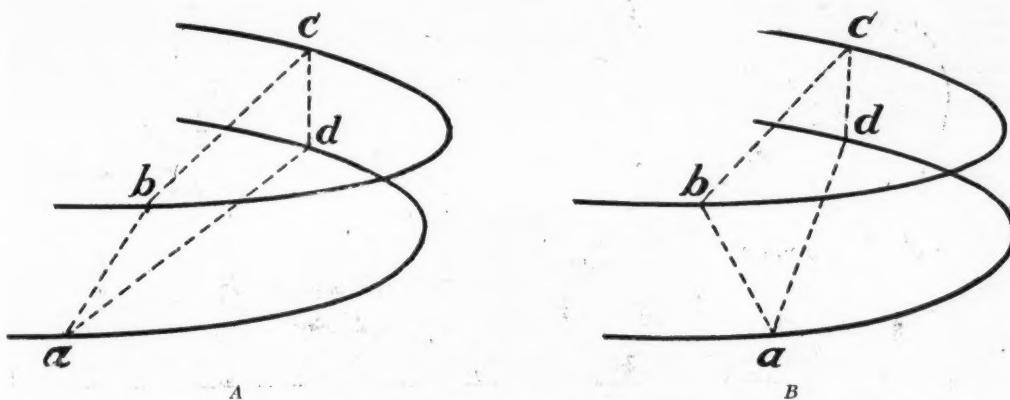


Fig. 12.—Diagrams illustrating arch mal-relations in unilateral distoclusion and unilateral mesioclusion.

is used. When confined to the upper jaw the word *maxillary* is added to indicate location; or, if confined to the lower, it is termed *mandibular micro-* or *macrognathia*. (Figs. 3 and 4, 5 and 6.) When both jaws are similarly affected the word *bimaxillary* is added.

Occasionally, the body of the mandible is curved downward, producing extreme obtuse angles with its rami, as in rickets, which may very appropriately be termed *mandibular curvature* (Figs. 7 and 8).

Fortunately, extreme malformations are not only rare in occurrence, but the present practice of applying treatment at a much earlier period in life than formerly has done much to diminish their number. Let us not forget, however, that malocclusions may lead to extreme malformations of the

jaws and their processes. Furthermore, the writer is of the opinion that the terms suggested above ought to be used only for the naming of extreme cases.

During the annual meeting of the American Society of Orthodontists held in Boston, in 1911,¹⁶ Dr. M. N. Federspiel, of Milwaukee, read a paper entitled: *A Consideration of Certain Types of Dento-facial Deformities*, in which he called attention to a hitherto unrecognized abnormality which occasionally complicates a malocclusion, viz., *malposition of the mandible*. It must be admitted that if this is a fact, then it is fraught with great significance. (See also Cryer, *Dental Cosmos*, July 1913, pp. 673-691.)

Subsequently,¹⁷ he presented an additional report in which he pointed

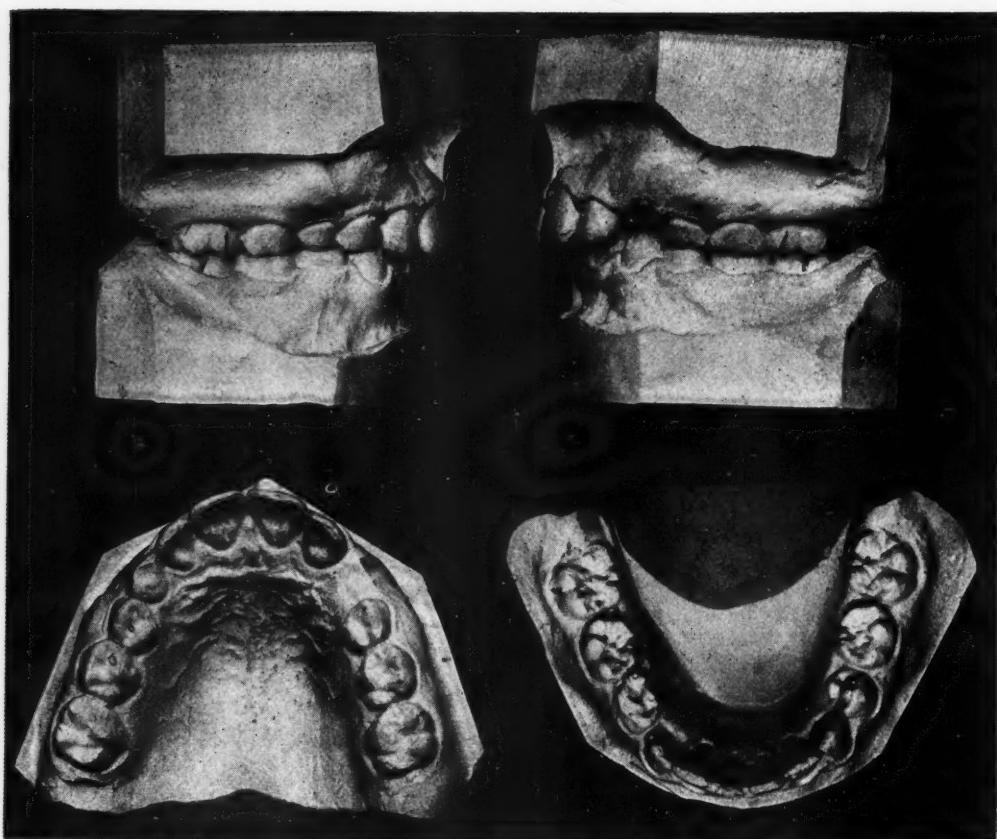


Fig. 13.—*Simple bilateral distoclusion.*

out the variability of location of the articular fossæ of the mandible, which are not stereotyped, or unchangeable. Dr. Federspiel therefore suggests the terms *mandibular anteversion* and *mandibular retroversion* (Figs. 9 and 10).

Careful clinical observation of cases presenting mesial or distal mal-relations of the lower arch have demonstrated that changes in development of the temporo-mandibular articulation are frequently involved. Many operators of unquestioned ability and very wide experience must also admit that failures in the treatment of these types are very apt to occur if undertaken after the developmental period. (*Frank confessions are eminently in order here.*)

The arrangement of the teeth in the form of two arcades or graceful

curves (an upper and lower, each with its right and left sides), demands a fine adjustment of the individual members of each if a symmetrical, well-balanced ensemble is to be established. Bearing in mind that we are here dealing with *bilateral symmetry*, we can readily understand how all of the upper teeth, or all of the lower, could be in perfect alignment in their respective arches, and yet, on closure, fail to come into normal occlusion. In other words, either arch (even though it retain a normal form), may be so displaced upon its osseous base, or the jaw upon which it is placed may be so malformed, that normal contact with antagonists is impossible. It is obvious that this may be symptomatic of jaw deformity, or of mandibular

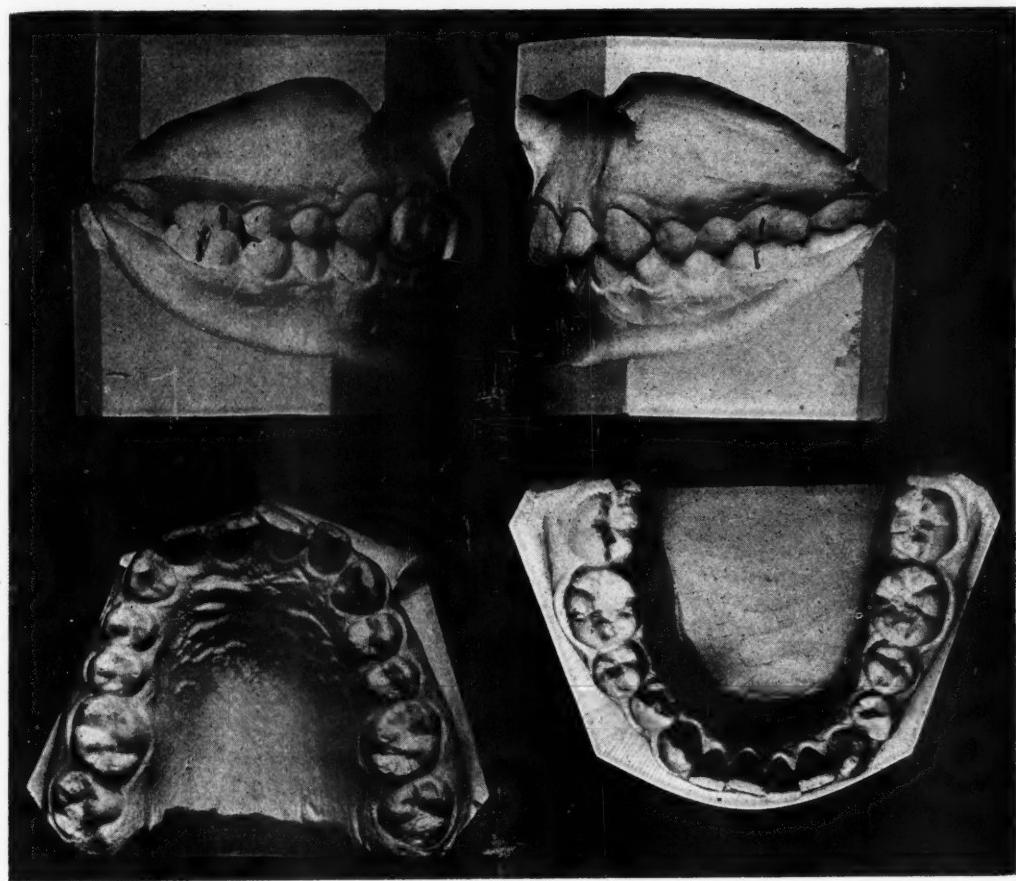


Fig. 14.—*Simple unilateral distoclusion.*

malposition, and that it is always accompanied by malposition of the teeth, though the latter frequently exists without the former. Differently expressed, in cases presenting only malposition of the teeth, accompanied by a normal mesio-distal relation of the arches, we have to deal only with *anomalies of arch form*. This latter type of malocclusion comprises our largest group of cases and will be referred to later.

Since the publication of Kneisel's book several writers have recognized the various forms of arch malrelation, but it remained for Angle to emphasize their far-reaching significance and to point out the unilateral, as well as bilateral, types (Figs. 11 and 12).

Now, in a consideration of arch-relation, we base our diagnosis upon normal closure, or occlusion, hence the ending *clusion* may readily serve us in the formulation of a diagnostic terminology. To this ending we therefore prefix well-known anatomical terms and thus get the following: *distoclusion* and *mesioclusion*.

Distoclusion is a group term applicable to all cases of malocclusion presenting a *distal* relation of the lower arch to the upper, when the upper jaw is approximately of normal development and the distal relationship is not due to mandibular retroversion or mandibular micrognathia. When both sides are distal to normal we term it a *bilateral distoclusion* (Fig. 13); when one side is distal to normal, a *unilateral distoclusion* (Fig. 14).

The complications of any given case are best expressed by the addition of a descriptive phrase, as follows:

- (a) Bilateral distoclusion complicated by labioversion of the upper incisors (Figs. 15 and 16).
- (b) Bilateral distoclusion complicated by linguoversion of the upper incisors (Figs. 17 and 18).
- (c) Bilateral distoclusion complicated by infraversion of the incisors (Figs. 19 and 20).

Mesioclusion is a group term applicable to all cases of malocclusion presenting a *mesial* relation of the lower arch to the upper, when the upper jaw is approximately of normal development and the mesial relationship is not due to mandibular macrognahtia or mandibular anteversion. When both sides are mesial to normal we term it a *bilateral mesioclusion* (Figs. 21 and 22). When only one side is mesial to normal we term it a *unilateral mesioclusion* (Fig. 23). The complications under either form are best expressed by the addition of descriptive phrases, as suggested under distoclusion.

I have already stated that in many cases (yes, in most of our cases), we find no jaw deformity of any consequence; no malposition of the mandible; no malrelation of the lower arch; that in such cases we have to deal with *malposition of the teeth* and consequently with *anomalies of arch-form*. In this large group of cases the mesio-distal relation of the lower arch to the upper is normal, or *neutral*, and hence the term *neutroclusion*.

Neutroclusion may therefore be defined as a group term applicable to all cases of malocclusion presenting a *neutral* or *normal mesio-distal* relation of the lower arch to the upper. It is understood, of course, that malformations of the jaws like bimaxillary micro- or macrognahtia are absent. The various forms of neutroclusion may be further classified into *simple* and *complex neutroclusion*.

Simple neutroclusion is a term applicable to all simple cases of neutroclusion, particularly to those between six and ten years, which are not complicated by facial deformity (Fig. 24). *Complex neutroclusion* is applicable to all complicated cases, especially when facial deformity exists. The complications of any given case are best expressed by adding a descriptive phrase, as pointed out above. (Figs. 25 to 31 inclusive.)

Malpositions of the individual teeth are best described by the use of the following terms: *Labioversion*, when labial to normal, *linguoversion*, when lingual to normal; *buccoversion*, when buccal to normal, *mesioversion*, when

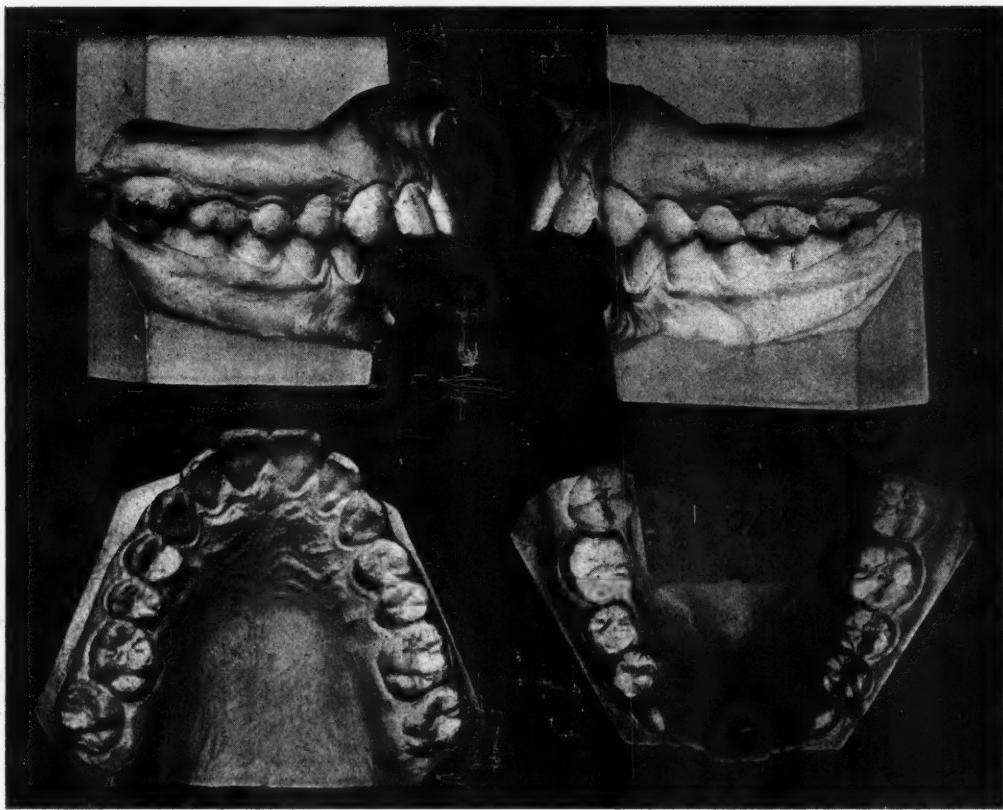


Fig. 15.—*Bilateral distoclusion complicated by labioversion of the upper incisors.*



Fig. 16.—Profile of case shown in Fig. 15.

mesial to normal; *distoversion*, when distal to normal; *torsoversion*, when a tooth is rotated on its axis; *supraversion*, when elongated; *infraversion*, when a tooth has not fully erupted, or has failed to reach the region of the occlusal plane; *transversion*, for transposition, and *perversion* for impacted teeth.



Fig. 17.—Bilateral distocclusion complicated by linguoversion of the upper incisors.



Fig. 18.—Profile of case shown in Fig. 17.

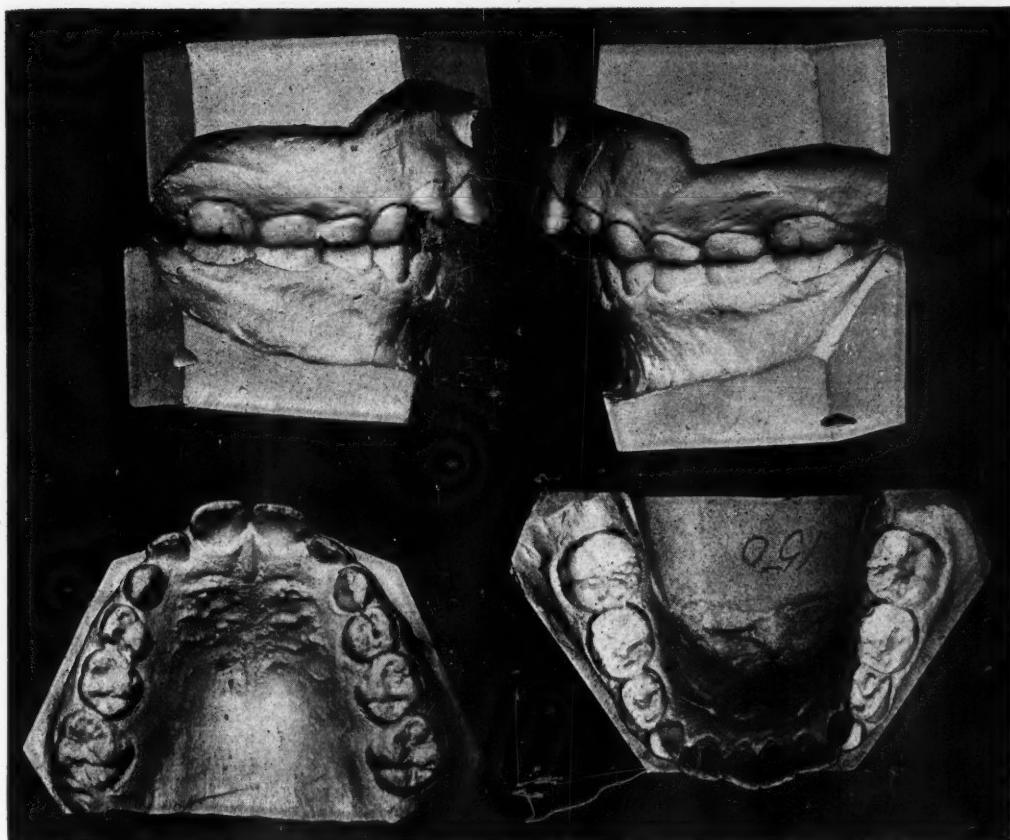


Fig. 19.—Bilateral distocclusion complicated by labio-infraversion of the upper incisors.



Fig. 20.—Profile of case shown in Fig. 19.

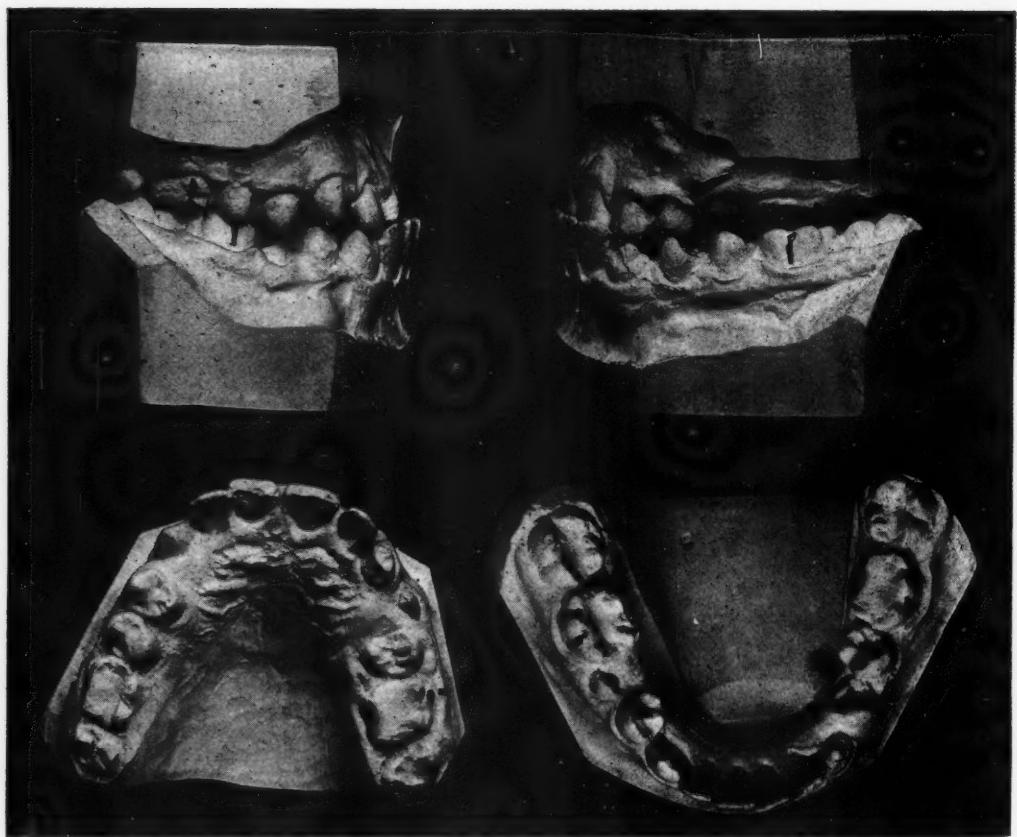


Fig. 21.—*Bilateral mesioclusion.*



Fig. 22.—Profile of case shown in Fig. 21.

Combinations of these are frequently found and are best expressed by combining the terms, e.g., labio-infra-torsoversion. (Please note the various plates for instances of the above.)

The ending *version* (from *vertere*, to turn, to change position), is preferable to the ending *clusion*, because position is more fundamental than occlusion. Indeed, occlusion is only a function of a tooth, whereas position in the universe of space is a condition of all existence. In other words, it is conceivable that a tooth may occupy position and not possess the function of occlusion; but no tooth can possess the function of occlusion without occupying position.



Fig. 23.—*Unilateral mesiocclusion.*

Furthermore, the diagnosis of arch malrelations is impossible without closure of the arches; and since we have adopted the ending *clusion* in formulating a terminology for such deviations, we are forced to adopt some other memory sign for the designation of malpositions.

Again, malposition of a tooth may frequently be recognized without closure of the arches, by merely observing its relation to adjacent teeth in the same arch.

In addition to the above deformities we occasionally meet with *congenital deformities* like cleft palate, agnathia, polygnathia, etc.; deformities due to *extraneous influences*, e.g., blows, fractures, burns, etc.; *deformities*

resulting from disease, e.g., fibroma, ankylosis, etc. All of these are comparatively rare and exhibit such marked variations that the construction of a descriptive terminology for them seems well-nigh impossible. Hence I have grouped them under the general heading of *miscellaneous deformities*.

4. The Present Status of Diagnostic Terminology.

I have already intimated that thus far only one constructive, co-operative effort at reform in the matter of terminology has been undertaken. To all sincere and conscientious students of orthodontics this is a sad, almost tragic, story. It is a grievous error to contend that the use of well chosen

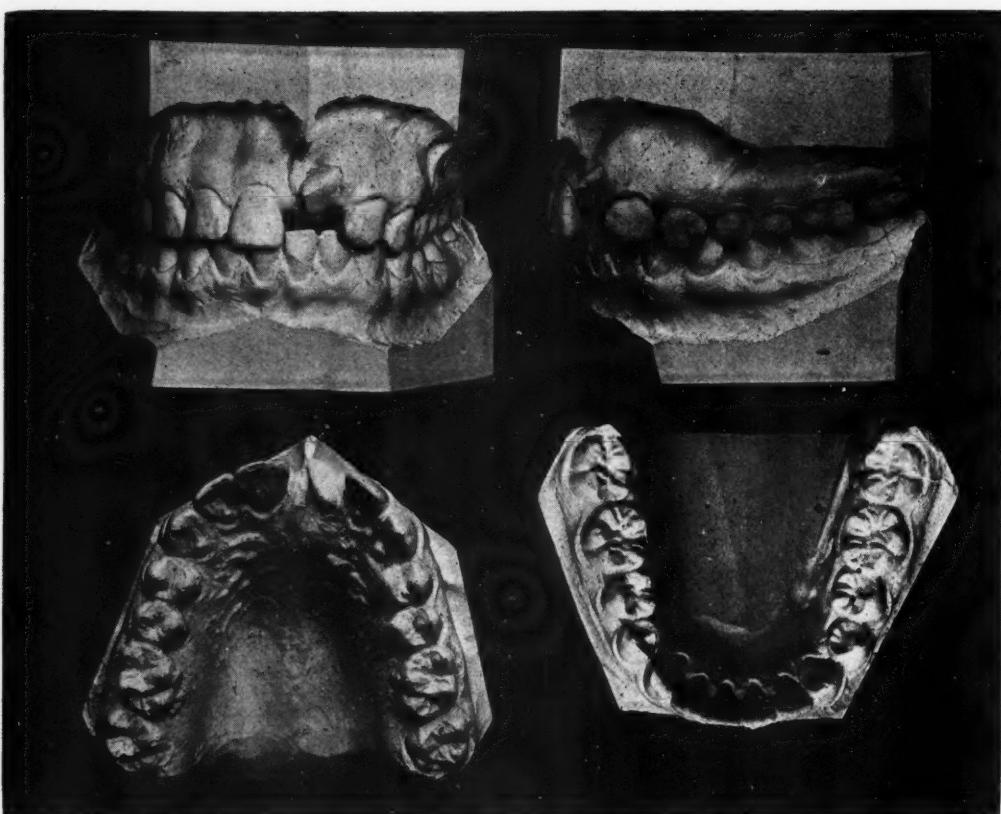


Fig. 24.—*Simple neutroclusion.* Note torque-infraversion of the left upper central incisor.

words and the growth of language are of no great consequence. As a matter of fact, "the growth of a man's inventive powers are developed through the use of intelligent speech." And, as MacNamara tells us in his work entitled "*Human Speech*": "It is evident that the use of words reacts powerfully on the mental development of our brains, for without their use our intellectual powers, even with well developed brains, fail to elaborate feelings or thoughts".

Indeed, the relationship between mental growth and language is so intimate that Professor Sully remarks: "The growth of a child's speech means a concurrent progress in the mastery of word-forms and in the acquisition of ideas."

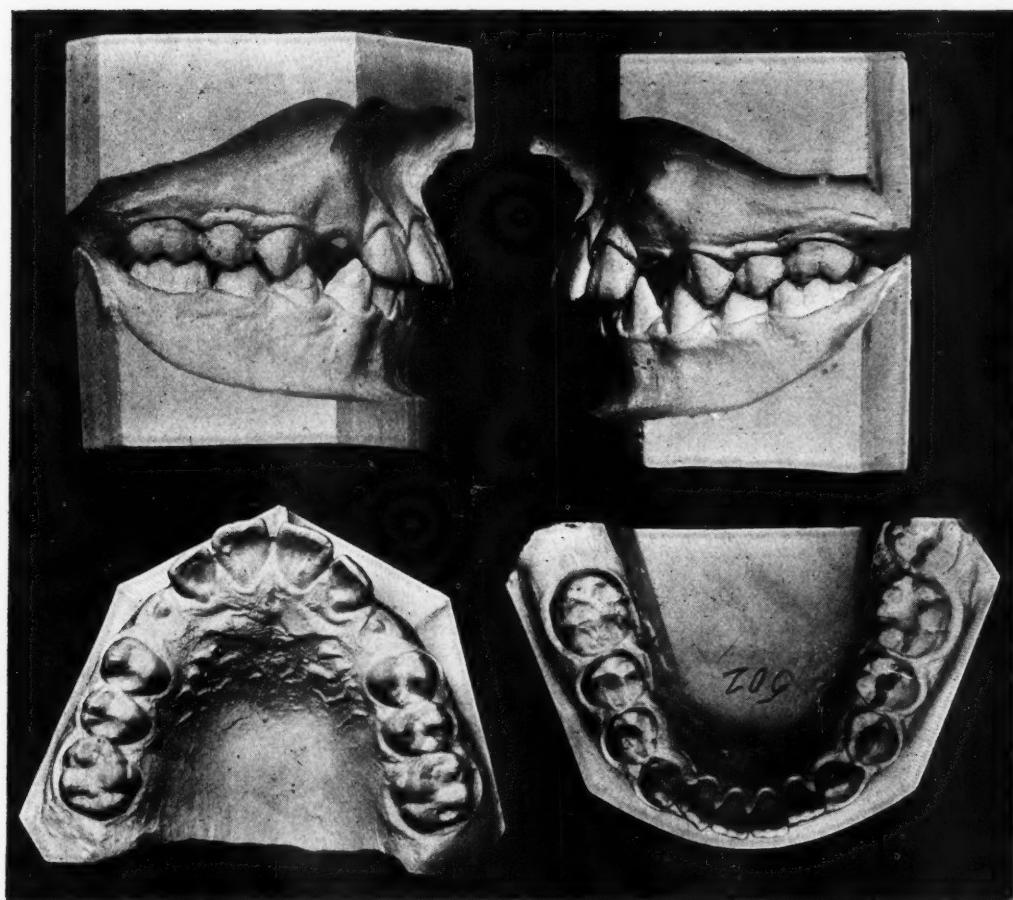


Fig. 25.—*Complex neutroclusion*, or, neutroclusion complicated by labioversion of the upper incisors.



Fig. 26.—Profile of case shown in Fig. 25.

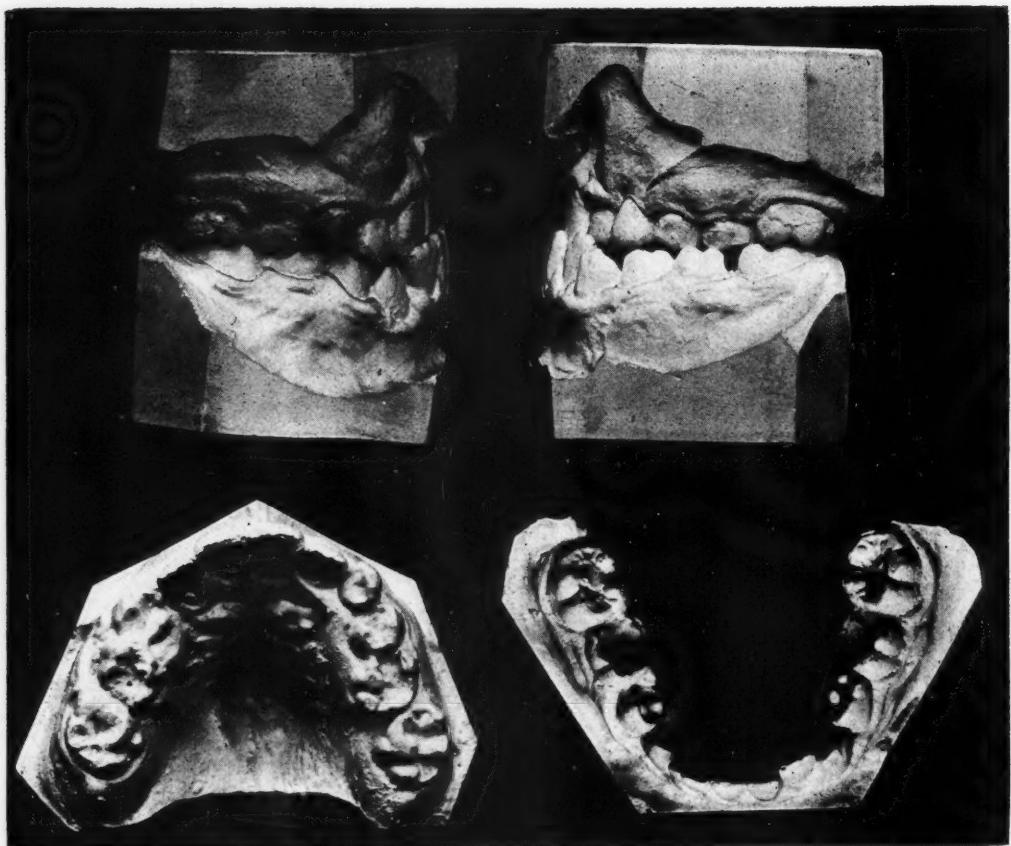


Fig. 27.—*Neutroclusion* complicated by linguoversion of the upper incisors.



Fig. 28.—Profile of case shown in Fig. 27.

Unfortunately, "the forms of expression first chosen are not always adequate to keep pace with the progress of science. Hence they must be radically changed and formed anew to meet the new demands".¹⁸ This is a problem with which every science and art must ultimately deal.

"The tragedy of urban civilization is the rearing of children in ignorance of the elements that have ordered human life, plants and animals, the tides and the winds, forest and hill. This uprooted person is the despair of all those who love the flavor of words, for his language has gone stale and abstract in a miserly telegraphic speech. That is why literary men are forever

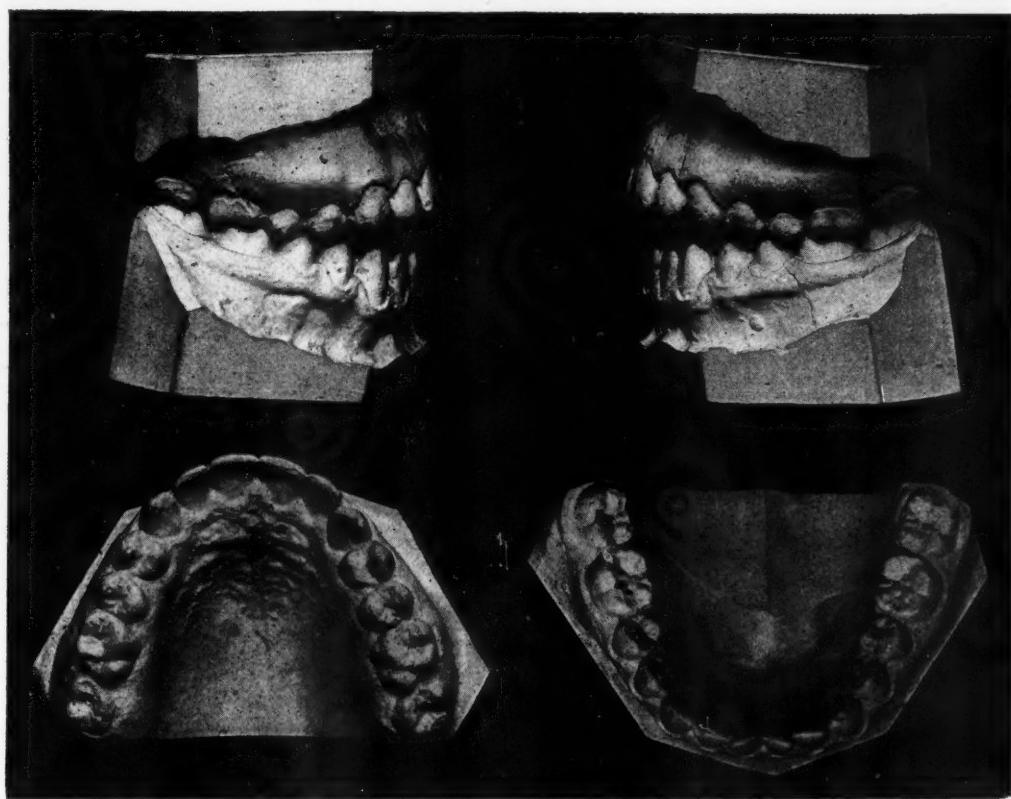


Fig. 29.—*Neutroclusion* complicated by infraversion of the anterior teeth.

hunting up folk songs and seeking out backward peasants in Galway or Cornwall. Among country people words still taste of actual things: contact with sun and rain and earth and harvest turns the simple prose of the day's work into poetry for the starved imaginations of city-bred people."

In this sense, orthodontists are decidedly "city-bred"; their imaginations are seemingly starved, probably from too close and continued application to matters mechanical. What we need, and need badly, is a thorough ventilation, or else suffer suffocation from the depressing atmosphere of *orthodontic orthodoxy*, which is a "handicap on thought and tends to emphasize non-essentials".

To illustrate, let us here consider for a moment the most widely used diagnostic scheme (that of Angle), with its numerical terminology. The realities which each of his three numerals try to express constitute a large

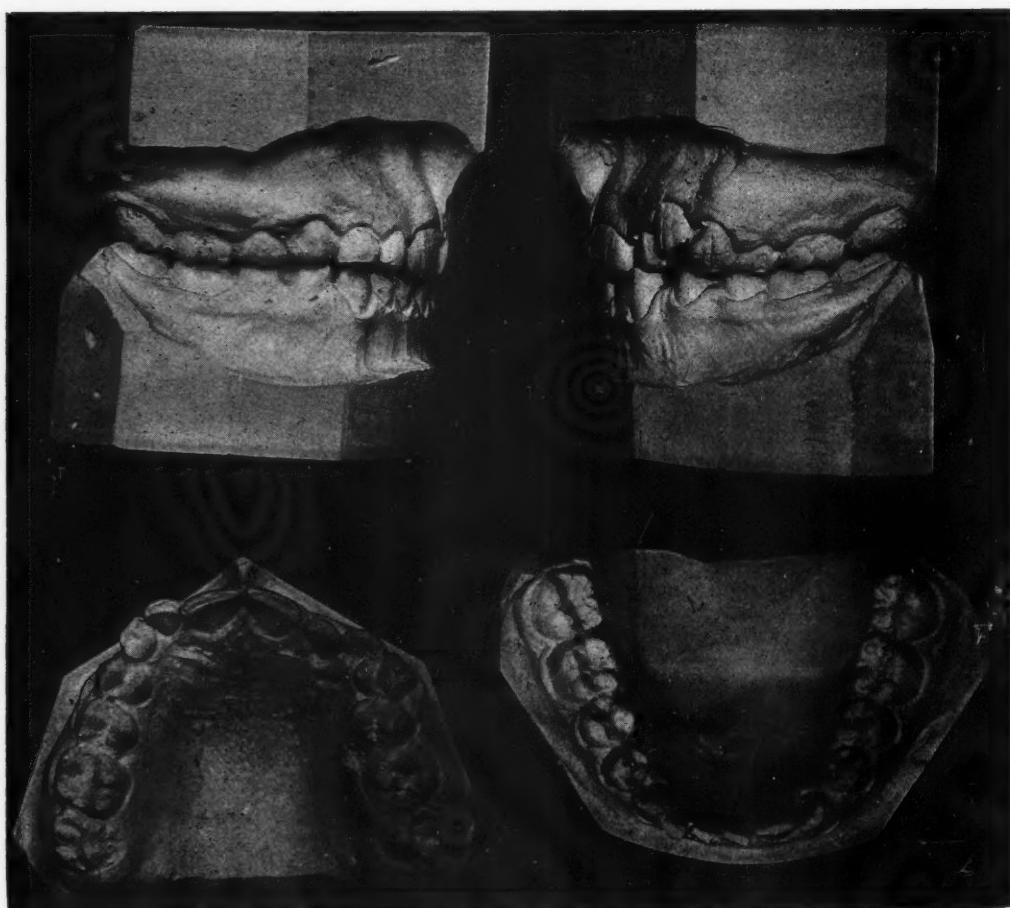


Fig. 30.—*Neutroclusion* complicated by perversion, deficiency and redundancy.



Fig. 31.—Radiographs of Fig. 30 showing perversion of right upper canine and right lower lateral incisor; deficiency of right upper lateral incisor; and redundancy of number under right lower deciduous lateral incisor. A cyst containing three supernumerary teeth is shown.

group, for which they are wholly inadequate as guideposts to the imagination. And in no other specialty of medicine are numerals employed for the designation of morbid conditions of the body. Indeed, if the matter were not really an important one, this whole question of the use of numerals would be a huge joke.

Numbers may be appropriate for the identification of door locks and latches, of tin cans and kettles, but not for the various forms of dento-facial

deformities. Hence it is a sad and sombre scene to observe a truly marvelous devotion of otherwise able men to three petty numerals, as though they were holy and divine. May I remind you that they were not handed down at Mount Sinai; that, though they are now "cast as rubbish to the void", the realities for which they once served as memory signs have not vanished from the earth. Indeed, there is no valid reason why we should feel downcast and depressed, because various other facts now command our attention and compel us to take this forward step in our progress. And progress in diagnosis and diagnostic terminology is as desirable and inevitable as progress in technique, or treatment. To live, a terminology "must rely upon its intrinsic merits, not upon the influence of authority".

But I do not come before you today to plead the acceptance of a complete and absolute scheme, or even that these pages contain an adequate exposition of the subject under consideration. I prefer merely to emphasize certain conclusions, and to plead for the *adoption of the scientific method* in a division of our work which is in dire need of radical revision. After all, *the principal characteristic of every science consists in its method and not in its material*; in a certain attitude of mind, rather than in things accomplished.

Finally, I wish to thank you for this opportunity of addressing you, a class of young, conscientious students, who have acquired an affirmative vision, and who are anxious for a career of usefulness. And I need hardly remind you that my remarks were not intended for "the man who approached life eagerly, and then tapered off to a middle age where the effort is over, his opinions formed, his habits immutable, with nothing to do but live in the house he has built and sip what he has brewed".

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DISCUSSION.

Dr. William J. Brady: Mr. Chairman and members of the Alumni Association: I first of all want to compliment Dr. Lischer on this paper with its accompanying slides. It is like everything that Dr. Lischer does, scholarly, thorough and scientific.

The paper is very interesting to me because I have given considerable study to the same subject during the last twenty years, and doubly interesting because I agree with him so thoroughly in his findings. It is also interesting because this sort of thing makes us aware of the progress that is going on in this particular line in orthodontia. Here is actual pro-

gress that has been made—not progress that is yet to be made, but something that has already been done, and we have seen it.

It seems hard for some orthodontists to realize that progress is going on steadily in all departments of orthodontia, and it seems still harder for them to admit progress when it is actually proved to them. They still stick to the old beliefs that the summit of orthodontic progress was reached long ago, and that nothing further is possible than what was given by the Fathers in "the good old days." This attitude has held the progress of orthodontia back a good many years in the matter of classification of malocclusion, and I hope that the conservatives may now be convinced that something further is possible than what we have so long accepted as gospel.

I do not want to belittle Dr. Angle's classification of malocclusion, for I count it one of the most important milestones of progress along the path of orthodontia, but it is out of date now. There should be no regrets over this fact, nor any lingering sentiment to attempt to prolong its existence for old times' sake. It has been superseded by something better and more complete. The Angle classification simply does not provide for several conditions we now recognize in daily work, and it imperfectly provides for still others. The time is here to use something else that does provide for the new conditions and for others that may be differentiated in the future.

There is not, and should not, be any feeling that Dr. Angle is being discredited in this progress in classification. Such things are as inevitable as the passing of time. Great discoveries are superseded by still greater ones in all lines. Even the great Darwin has been surpassed, and his writings are now simply a curiosity serving as a landmark to show the evolution of science as time has rolled by. Even Thomas A. Edison has seen a better lamp come into existence than he ever dreamed of, and all in less than a lifetime. If progress like this is made yearly in other lines, why may we not expect equal progress in orthodontia?

Dr. Angle based his classification on what seemed a fact—that the molar teeth developed and erupted in just about the proper place; and that the relation of the upper and lower dental arches could be determined from the positions of the molars, making allowance of course for any shifting of the molars that could easily be accounted for by extraneous means. This served its purpose as long as the relation of the two dental arches was the main thing under consideration. Dr. Angle had in mind more than just the immediate relation of the arches, but this was not well brought out in his teaching, and was never well understood from his writings though he undoubtedly understood it himself, as I know from conversations on this point.

Dr. Angle's classification was built upon normal occlusion of the teeth, and the teaching has been for so, these many years, that normal occlusion was the basis of all orthodontia and even all dentistry. But normal occlusion is simply an incident in what we now study and now recognize as the basis of orthodontia. The normal development of all the structures of the face, jaws, mouth, and teeth is the basis of orthodontia today, and all our diagnosis, all our classification, all our treatment, all our retention is based upon our knowledge of this much greater foundation. Normal occlusion is only one part of this development, and it is not the most important part. As stated before, normal occlusion is only an incident in the general development we now study.

Now when Dr. Lischer presents this new classification of malocclusion, it possibly does not occur to all of you that the principle underlying it is greater than the substance of the classification itself, nor that this principle is much advanced over anything we have ever had before. But it is new, and it is advanced. So I say it represents progress made—not something to be done later on when we discover something or other, but something that has already been done, progress that already exists. There is no question of any kind about it, except whether or not we can recognize progress when we see it. I know that others have been unwilling to accept Dr. Lischer's findings, but this can only be accounted for by their obtuseness. I say there is no question about it; the progress has already been made. I hope that this Society will not be backward in recognizing it, or allow prejudice to blind their eyes, as seems to be the case in some other quarters.

I hope later to do my share in presenting the facts of present-day knowledge concerning development of the structures of the face and jaws, and to urge the acceptance everywhere of Dr. Lischer's classification. I hope to show some things that even this

scholarly and complete classification does not cover. There is more to the story than even Dr. Lischer has told. And I warn you, good Doctor, that I shall try to surpass you if possible. I once tried my hand on the classification problem, and hunted up a nice lot of long, hard names, which I had all ready when your classification came out some time ago; so I threw the whole mess in the waste-basket as I believed yours better. But if I, or anyone else, can devise a better classification than yours, then yours shall go into the waste-basket as promptly as mine did.

I will not say more, Mr. Chairman, except to again express my appreciation of the paper that Dr. Lischer has given us, and to hope that this advanced and scientific classification of malocclusion will soon be accepted by all orthodontists, as it should be in justice to him and in justice to ourselves as progressive and scientific men.

Dr. H. C. Pollock: Mr. Chairman and Dr. Lischer: This question of nomenclature and classification is a child of Dr. Lischer's brain. He has given this question a great amount of thought and mature consideration lasting, I think, through a period of years. He no doubt has a great deal of basis for the argument he makes. I have been very much interested in hearing it. This is the first time I have ever had an opportunity of grasping the big idea, just exactly what this was all about. I think I have a very clear conception at the present time of the full scope of the modifications and improvements which he points out.

There is no doubt but what this classification has a great deal of merit; that it indicates progress. There are modifications of previous methods in it that are much more extensive than we have had before. I am very glad to see Dr. Lischer take up the question of the relation of the maxillary bones. I think in the past we have been so thoroughly occupied with the occlusion of the teeth that we have largely lost track of what Blair points out in regard to perverted maxillary development.

There are present men who have been more or less familiar with this question of classification for years, have given it much study and attention, were practicing orthodontia before we had any classification and I much prefer to listen to those who have prepared to discuss this interesting paper.

Dr. Martin Dewey: Mr. President, friends, and members of the Alumni Society: In taking up the discussion of the paper of Dr. Lischer on Classification of Malocclusion, we are approaching a subject about which there is a great amount of discussion at the present time. We are discussing a subject which has been a source of debate for many years, and one which was never satisfactorily mastered until Dr. Angle produced his classification of malocclusion which was based upon a study of normal occlusion. There has been a great amount of misunderstanding, a larger amount of criticism of the Angle classification, both as to its manner of arrangement and manner of terminology. If normal occlusion is the basis of orthodontia, is the basis of all dentistry, then classifications of malocclusions have their beginning from the study of normal occlusion.

There has been some misunderstanding, because in taking up the classification of malocclusion men have based their diagnosis upon individual teeth instead of upon the relation of one arch to the other. Lischer has followed Angle's classification to a certain extent in that he has classified cases as they deviate from the normal either in a mesial or distal direction. Even the use of the terms mesio-occlusion and disto-occlusion, or mesial and distal relation of the arches, as has been employed for a number of years, we find open to more or less dispute. It probably would be much better if, instead of mesial, we had used the terms anterior and speak about the anterior relation of the arches; or, combining the two, speaking about a normal antero-posterior relation. Therefore such cases which Angle would call *Class I* cases, and which Lischer calls *neutroclusion*, because the lower arch is neither too far forward or backward, might be better spoken of as cases in which the arches possess normal antero-posterior relation to each other. Now, when we speak of arches, we mean more than the first molars; for it has been shown that the upper molar can occupy an abnormal relation and still have a normal mesio-distal (antero-posterior) relation of the arches.

In Fig. 1 (p. 316), you see a case where the upper first molar on the right side occupies an anterior position to its normal relation while the antero-posterior relation of the other teeth in the upper and lower arch is normal. Owing to the early extraction of the decid-

uous teeth the upper first molar has taken an anterior position to what it should occupy. The upper canine, which is the deciduous canine, is the only tooth that has not been disturbed; therefore it still occupies its normal relation. We have a normal antero-posterior relation of these arches, which would be defined according to Lischer as *neutroclusion*, with mesioversion of the upper first molar. This case has been criticized a great deal by some of Angle's students who claim it belongs to Class II because the upper first molar is mesial. Now Class II cases, according to my understanding, are those cases in which we have a

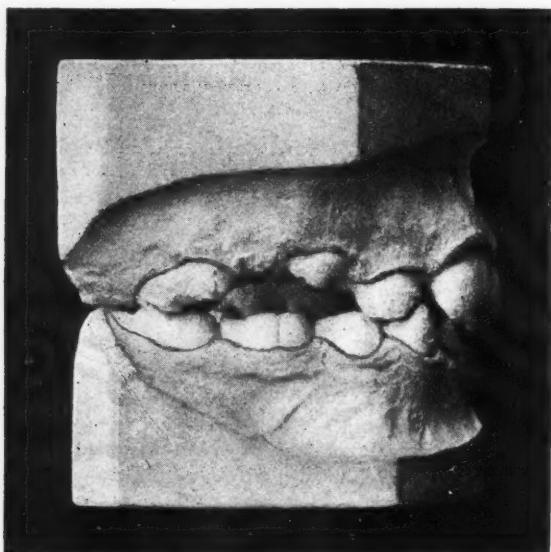


Fig. 1.

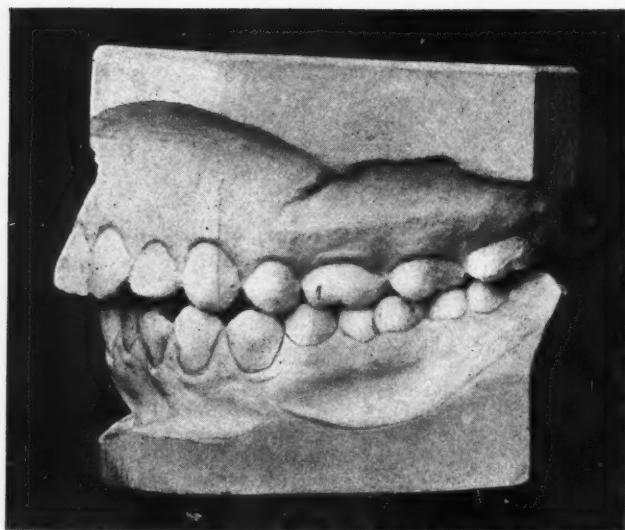


Fig. 2.

distal, or posterior, relation of the lower arch. In Fig. 1 we have no posterior relation of the lower arch, but a mesial or anterior relation of the upper molar. Therefore Fig. 1 cannot be anything except a case of normal antero-posterior relation of the arches with an anterior position of the upper molar.

Dr. Lischer showed a case in which he stated that it was his belief that the upper molars and premolars, owing to some peculiar etiological factors, had taken an anterior position to

what they should occupy.* In other words, the lower arch was normal in position to the face, normal in relation to the rest of the bones of the cranium, and the upper incisors occupied a proper antero-posterior relation to their supporting structures. But the molars, premolars and canines of the upper arch had moved forward and the case would therefore be termed a case of neutroclusion, or normal antero-posterior relation of the arches with a mesial or anterior position of the upper molars and premolars. While it may be possible that there are etiological factors which will allow the upper posterior teeth to drift forward, which will allow the upper molars and premolars to drift forward so as to cause a crowding of the canines, we have here shown in Fig. 2, and also Fig. 3 (the occlusal view of Fig. 2), a case which shows that the upper molars on the left side had clearly drifted forward and drifted forward to such an extent as to cause a lingual relation of the upper second premolar. The upper second premolar was the last of the group to erupt, the deciduous molar had been lost early, and owing to the fact the molars drifted forward, there was no place left for the second premolar. The canine and first premolar on the left side shows a normal position, therefore this case again would be classified as one in which you have the normal antero-posterior relation of the arches and a mesial relation of the upper molars on the left side.

I want to caution you, that in classifying malocclusion that you do not base your classification upon the mesio-distal relation of the molars, which has led to a great amount of dispute and a great amount of confusion, and has resulted in men classifying cases differently. If cases are classified upon the mesio-distal relation of the arches, it will be possible to outline a particular and satisfactory line of treatment.

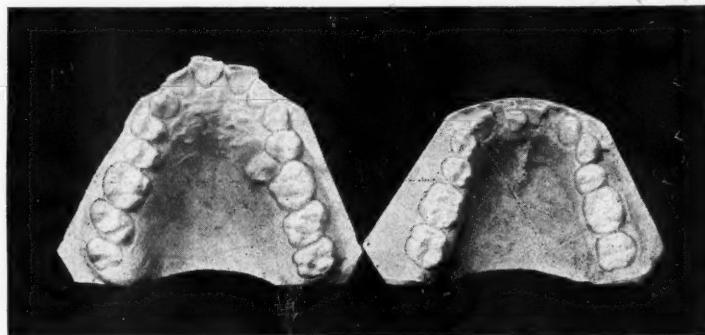


Fig. 3.

Dr. Lischer also suggested the use of the term *labioversion* and *linguoversion* in preference to *labial occlusion* and *lingual occlusion*. In using the word *version* he refers to the relation of the tooth of one arch to the line of occlusion. In using the ending *clusion*, as in mesioclusion and distoclusion, he refers to the relation of one arch to the other, which makes a very good distinction. While I have objected at times to the use of the ending *version*, and do not know now that it is really the best term to employ, the use of mesioversion is much more simple and clearly understood when referring to a single tooth than the use of mesio-occlusion, which may refer to an arch, two or three teeth, or one tooth. Therefore it is to be recommended that we have a term which denotes malposition of a tooth and another term which denotes malrelation of the lower arch to the upper.

The use of the numerals I, II, and III, of course, was a very simple thing to decide upon because we can have but three types, or classes, of malocclusion. Malocclusions are based upon the antero-posterior relation of the lower arch to the upper. That is, we have one class of cases which possess a normal antero-posterior relation, which Angle placed in *Class I*. There would then be another group which would occupy a distal relation of the lower arch to the upper, which he placed in *Class II*, and which has been called distoclusion (which is a much better term), or which could be described as a posterior relation of the lower arch, which would be even more explanatory. Then, again, a third class of cases would be those in which the lower arch was mesial to the upper, which has been called

*The essayist showed one hundred lantern slides, but lack of space forbids the publication of all of them.

Class III by Angle, *mesioclusion* by Lischer, and which again would be more clearly described by speaking of them as an anterior relation of the lower arch to the upper. There have been several attempts made to originate, according to the Angle classification, a *Class IV*, which would be intended to describe a condition as shown in Fig. 4, which con-

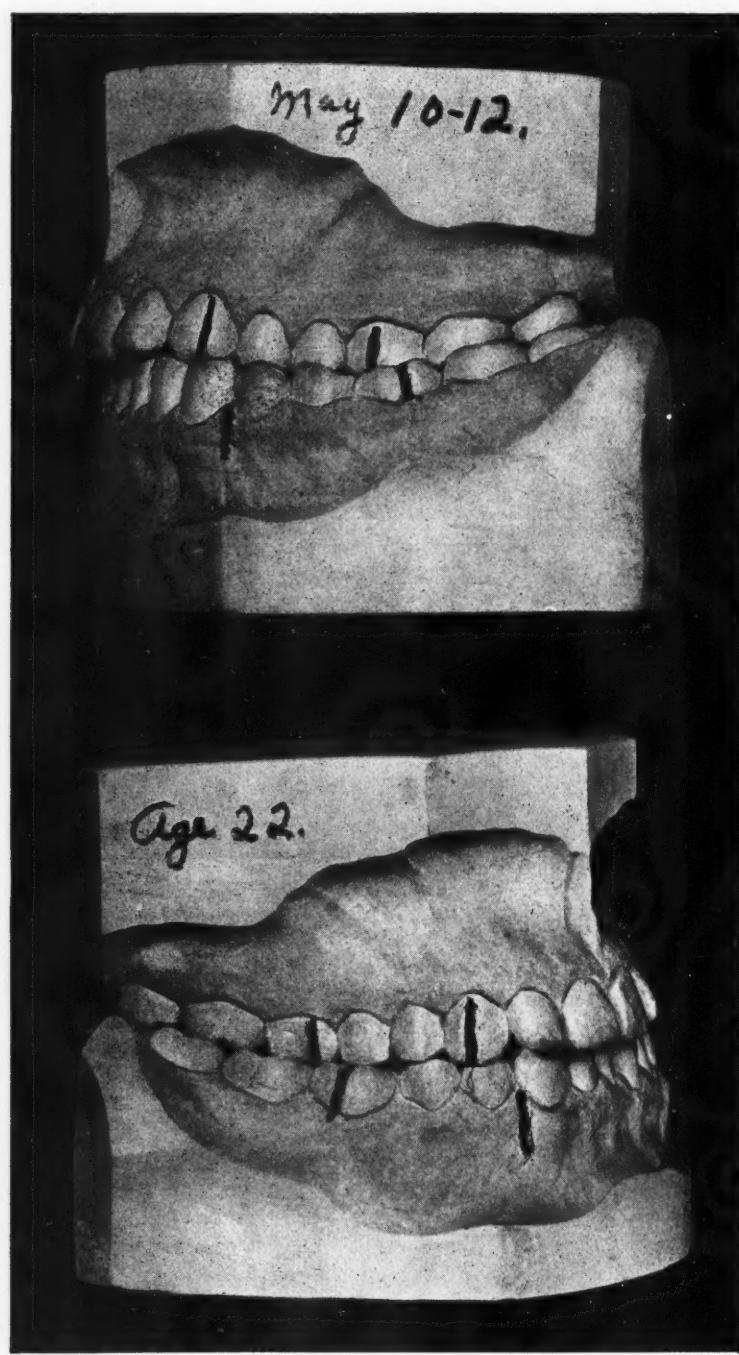


Fig. 4-A.

sists of a case where the lower arch is mesial or anterior on the right side and distal or posterior on the left side. Under Angle's classification, or any classification that is based upon the deviation from the normal in anterior and posterior directions, there can be but three groups of malocclusion. The case shown in Fig. 4 is what might be termed, pathologically,

a "hybrid", which is an incorrect term to use, as the case is one in which you have a mesial relation on one side and a distal relation on the other, which is the only way that it can be classified. If you call it a *Class IV* you have destroyed the principles upon which you have based your classification; but there are conditions, as we see in Fig. 4, in which the lower teeth are mesial on one side and distal on the other, which can be described only as saying you have a mesioclusion on the right side and a distoclusion on the left side.

I am aware of the fact that the use of the numerals *I*, *II*, and *III*, has been accepted by a large number of men, and among them men who are versed upon that plan of classification, so that it may represent a certain symbol, or a certain condition. To me *Class I*

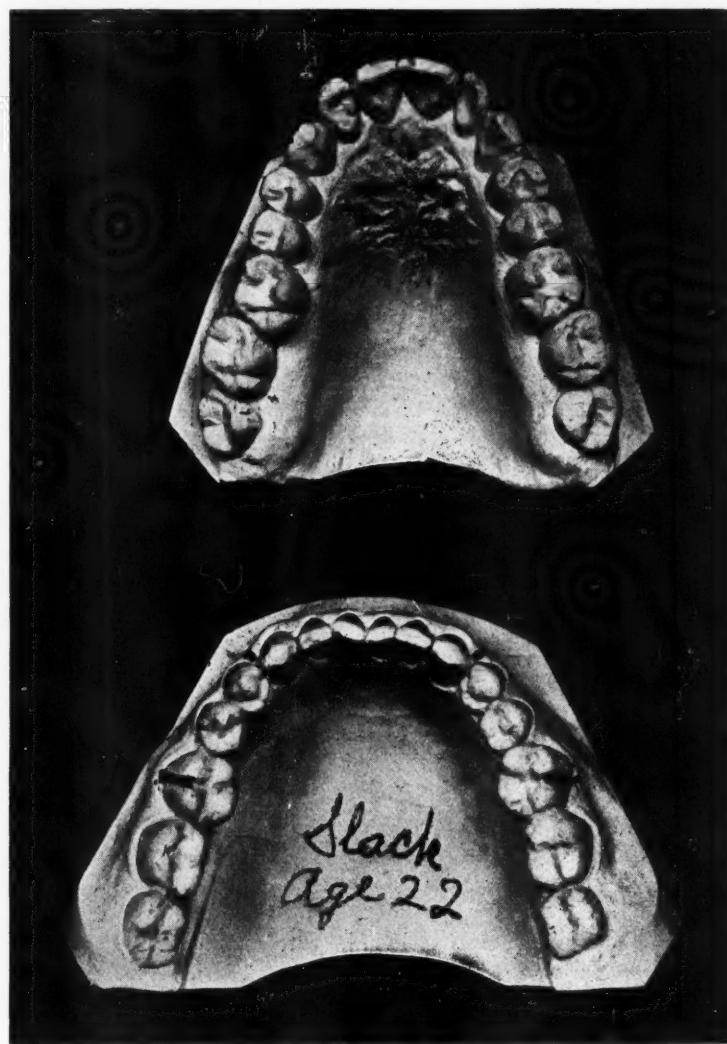


Fig. 4-B.

has a certain meaning. *Class II, division 1*, presents another picture with all the symptoms which go with those cases. But I have had it forcibly impressed upon me in the last six months that even some men who are practicing orthodontia do not grasp the significance of the basis of classification and that they have been using the terms of *Class I, division 1*; *Class II, division 2* and subdivision, very much the same way as "Polly wants a cracker." They have been repeating numerals and have been unable to describe conditions, and when asked for certain pathologic conditions as they exist, or are asked to make a diagnosis of the case as it differed with the normal occlusion, I have found a great many who could not do so. I have also seen a number of men classify the same case and put it in two or three different classes because some were classifying from the molars, some from the arches, and some were

simply guessing. Therefore, in closing, I will say that malocclusions must be classified, if classified scientifically, upon the deviation from the normal. They must be classified upon the relation of one arch to the other, the relation of the lower arch to the upper, and not the relation of the molars to each other. We can have an abnormal relation of the molars and still have a normal antero-posterior relation of the arches. The use of terms which are more descriptive than numerals are preferable.

Dr. C. V. Mosby: Gentlemen, I suppose you are all thoroughly familiar with the old Irish story of the Kilkenny cats. When I suggested to my friend, Dr. Pollock, some months ago that we give to this great and rapidly developing science a journal through which it could give its views to the world, he said to me: "Well, you will be worse than the Irishman, and very much worse than the cats." And I was told that it was on the subject of nomenclature where the light would beat the brightest around the throne. I must admit that after my experience with you gentlemen this morning, that my friend Dr. Pollock knew whereof he spoke.

I was at Ann Arbor a few weeks ago at a meeting of the National Association of Dental Teachers, and there I heard this subject of nomenclature discussed from eight o'clock in the evening until the wee small hours in the morning. It reminded me of the child who builds his block house and then knocks it down only to rebuild it again. I was convinced, more than ever, that nomenclature, to the science of dentistry as well as to the science of orthodontia, was practically the life blood of it; I certainly hope that there will come a day (and that that day will not be far distant), when the atmosphere surrounding the nomenclature of this great science will be much clearer than it is at present.

I have had the pleasure of associating with Dr. Lischer for a great many years. I think it was in his office some twelve or thirteen years ago that I first heard the mention of this specialty; and I certainly feel that to him, as much as to any other man in the world, is probably due the evolution that is now going on in this specialty. I feel that it is not my province to offer suggestions to you gentlemen on this subject, because I am in the same position as Dr. Blair; I know little or nothing about it. Being vitally interested, however, in the new journal, I wish to say that its columns are open to the views of each and every one of you, and I hope that out of this chaos prevailing with reference to terminology there will ultimately come a day when orthodontic nomenclature will stand upon an absolutely firm foundation.

Dr. Lischer: I have very little to add in closing the discussion of my paper, except to say that I am very thankful for your kind reception and remarks, and for your general acceptance of its fundamental proposals. It is very gratifying to learn that you are all thinking along these lines, that you feel the need for progress in this vital division of our art.

As I have already stated, my scheme is not dogmatic, or one which will never need any further additions or alterations. Hence if Dr. Brady, or anyone else, will work out in greater detail the morbid anatomy of certain types of oral deformities in a manner which will necessitate further changes or additions in terminology, I shall be the first to extend to him a hearty welcome.

I want to say, in conclusion, that I am not "married" to my terms; so far as I am concerned you need never mention my name in connection with them. But if they appeal to you as meritorious, then the greatest favor you can confer is to use them. As for myself, I shall continue to use them as long as there are no better ones, for I believe they are superior to any, or all, that have gone before. But if a better classification and terminology is ever proposed, then I shall help you to bury them with the numerals, at least six feet below the sod.

As I said in Toronto last summer, such possibilities do not disturb me, because I am firmly convinced that the fundamental conceptions upon which my scheme is based are true to the facts as we find them; and I have no desire to monopolize thought, or to compel the acceptance of any particular scheme. The morbid anatomy of dento-facial deformities comprises many complex conditions, and I am very sorry, indeed, that this whole matter is not as simple as some seem to think. Besides the four fundamental deviations from normality to which I referred in the paper, we have many varying degrees of deformity, and all of them combining with one another by almost imperceptible gradations. But if we keep their pathological anatomy in mind, many of our difficulties will be overcome.

ORAL PROPHYLAXIS IN THE PRACTICE OF ORTHODONTIA.*

BY DR. WM. H. BOLTON, D.D.S., SEATTLE, WASH.

WE have all heard a great deal about oral hygiene, its benefits if properly followed and the harmful results if neglected, but to the best of my knowledge I believe that in orthodontia, we are prone to devote our time in study and experiments along mechanical lines, and have allowed oral prophylaxis to be confined to the general practitioner. Dr. Ferris, with a few others, has devoted much time and thought to the deleterious effects of certain stains, acid decay, etc., that might be due to chemical action of the saliva upon the metal of the appliances; still, I feel that the teeth are not the big factor in disease-producing conditions throughout the body, directly or indirectly attributable to oral infections.

Three years ago a regular crusade swept over the country regarding oral prophylaxis. Statistics of mouth conditions were furnished, many diseases of the eye, ear, nose, throat, lungs, stomach and intestines were traced either directly or indirectly to some source of infection coming from the mouth and teeth. Lecturers preached oral hygiene, clinics were given demonstrating oral hygiene. Dr. Eversole showed that neglect of oral hygiene impaired the intellect; movies were given on oral hygiene; many cities attempted taking care of thousands of mouths, and finally the medical profession came to realize, in a way, that many diseases had their inception in the mouth, and that the prevention of these diseases could be accomplished by proper care of the mouth.

If this was true only three years ago, is it not then true today? Are there not as many diseases due to infected mouths now as then? Are not 95% of our children in as bad a condition, the result of neglected oral tissues, at present? I have no hesitancy in answering yes! What is the reason? I would seem that the dental profession, after suggesting methods for maintaining oral cleanliness, had decided their duty was finished, and had gone back to mechanics, devoting time and thought to just what has kept dentistry in the background of medicine for the last eight years, "the tooth carpenter!"

We know this is a grave mistake; all of us must realize the vast importance of these tissues upon which we have selected to do our life work, and devote our energies to the study of how to keep them in an ideally hygienic condition, in this way eliminating many of the ailments children and adults are now subject to.

In enlightened circles, oral hygiene is recognized as one of the most important branches of both the medical and dental sciences; they have awakened to the fact that a foul mouth is the preface to many a funeral event, and that a healthy condition of every organ of the body is contingent in some degree, on mouth cleanliness. This being true, if we as dentists do not accept our duty and progress along these lines we shall certainly have the humiliation of seeing the medical branch step in and show us the way, thus relegating the dental practitioner to mechanical pursuits rather than to scientific investigations.

*Read before the Meeting of the Pacific Coast Society of Orthodontists, San Francisco, Cal., Feb. 21-24, '15.

Dr. Rosenow, of Rush Medical College, states, that in his bacteriological experiments he has proven that the pus-pockets around teeth, caused by gingivitis, pyorrhea, etc., are a most ideal breeding ground for bacteria that in turn produce disease such as endocarditis, arthritis, appendicitis, ulcer of the stomach, etc. He claims the conditions are such that these micro-organisms multiply by the millions, and upon injection into rabbits, guinea pigs and dogs, produce identically the disease found in man.

He goes on to say that when these lacerated gums are allowed to remain in this condition, that even if the individual is able to combat these many disease producers his organic tissues are exposed to, that it is bound to shorten life, due to the constant fight that is required to overcome the ravages on human vitality.

Cleanliness is not the panacea for eliminating the media upon which disease producing bacteria thrive, for it is known that about 130 different micro-organisms occur in the mouth normally, whether the teeth are so-called perfectly clean (it is impossible to produce a surgically clean mouth), or not. It is local lesions of the soft tissues that we must look out for, and this we will call oral sepsis; this term covers a multitude of mouth ills. Dental caries in itself is not a septic process. It has never been proven that dental caries without lesions of the soft tissues, was the cause of any systemic disease, although they of course render the denture unfit for occlusion and thus cause bolting of food, often resulting in intestinal putrefaction, the mouth being offensive in the same way as a cesspool might taint the air about it.

Do not confuse unclean with unhygienic, for we may have unclean or dirty mouths and still have a normal amount of disease producing bacteria present, but as soon as the soft tissues are involved then an unhygienic mouth is established and a great increase of these trouble-making micro-organisms takes place.

Still to this day many dentists labor under the impression that oral hygiene means nothing more than maintenance of a degree of tooth cleanliness which will either prevent or retard the development of dental caries. It is known and conceded that clean teeth will prevent caries. Dr. D. D. Smith of Philadelphia has demonstrated it beyond a doubt, and the orthodontist can do a share of good work by drilling these facts into our patients; however, let us not stop there, for as I said before, this is not the main object we are striving for. Our aim is not only to beautify, but also to place the dental apparatus in such a form that thorough mastication may be accomplished, and the nasal functions so improved that respiration is normal, the inspired air is properly heated and filtered in order to remove foreign substances, etc. This is all done to establish better circulatory tone and therefore greater mental and physical efficiency.

We will, however, fall short of accomplishing this if we do not realize the value of the soft tissues of the mouth. I believe our field is peculiarly adapted for instruction along this line. It is safe to say that 90% of our clientele is made up of children from three to eighteen years of age. Without egotism, I believe the majority of parents feel that we are more fully informed regarding dental matters than the general practitioner and consequently our advice carries more weight. These patients being under our observation

at regular intervals for a long period of time, we are in a much better position to observe if our instructions are carried out to the letter.

We must endeavor to impress upon the parents and children the necessity of thoroughly brushing the teeth. Many, no doubt, give demonstrations on the proper methods to pursue, but how many go a step farther and insist upon a rigid massage of the gums? I fear but few. This, in my opinion, is the keynote for the prevention of gingivitis, pyorrhea and many other diseases of the soft tissues, producing these pus-pockets that Rosenow and other scientific workers tell us are the ideal breeding ground for the bacteria that cause such havoc to the human economy. It was a mistake that the name tooth brush was ever given to this instrument of prophylaxis—it should more properly have been called the *gum brush*.

What has brought this gum massage to my notice with so much force, is the fact about five years ago I had a decided case of pyorrhea in my own mouth; the gums were receding, a space appeared between the upper central and lateral incisors; also several teeth were becoming loose. After a thorough instrumentation for the purpose of removing all calcarious deposits, I took up the massage of the gums every night and morning, after brushing the teeth with powder. I used a stiff brush and cold water, starting at the attachment of the lips and cheeks and thoroughly massaged the gums, always working down or up, as the case might be, toward the teeth, inside and out. This treatment I have faithfully continued, with the result that no manifestation of pyorrhea has appeared for over five years, and no instrument has been used for the removal of deposits during that time.

This impressed me so strongly, that for the past two years I have been making a practice of preaching it to my patients, with but little success at first. However, by explaining to the parents the great benefit that would accrue to the child later in life, and by adopting the use of the rubber finger mat, I am having better results. There is no value attached to this method over the gum brush, in fact I doubt if it is as good, but it is something different and a child can reach inaccessible places with more ease and it is less irritating to sensitive tissue at first. Another virtue of the rubber finger mat is that, being sold in a celluloid container, it is protected from contamination; it is also much easier to keep this rubber mat clean than any brush, for it can be boiled if necessary.

At the beginning of a case, I give them one of these mats, with instructions on how to use it, and by the time the appliances are in place, the gums are no longer irritated by the massage. If instructions are carried out faithfully all congestion is relieved, no puffy gums are to be seen, and the tissue presents a pale pinkish tint, instead of a mottled appearance, as is observed in the presence of a sluggish circulation.

Massage of the gums stimulates circulation, thus increasing the vital resistance of the tissue around the teeth and preventing to some extent the growth of pus-producing micro-organisms and the formation of pockets that make a breeding ground for the bacteria which are normally in the mouth and which by passing into the stomach, intestines and blood stream, finally reach a suitable spot where an active focus is inaugurated.

For the future benefits of patients and also to furnish some reliable data for scientific thought and research I would urge every orthodontist to take up this treatment and to watch results.

DISCUSSION.

Dr. John R. McCoy: A great many of the profession as well as the general public are in ignorance in respect to the value of oral prophylaxis. Dr. Bolton has said quite truly that orthodontists limit themselves to the mechanical end of orthodontia and do not give enough of their attention to prophylaxis. Another important point that he has brought out is that the body resistance is greatly decreased by the presence of sources of infection in the mouth. The essayist's idea of gum massage to increase the circulation and therefore the resistance of the gum tissues is an excellent one as well as his means of accomplishing it with the rubber finger tooth brush, because the tooth brush is more liable to breed infection, as it is but rarely kept clean. In my mind a most important prophylactic measure during orthodontic treatment is to keep the arch wires thoroughly cleaned and polished. If you have ever tried to remove the filth and corrosion from the arch by any other than mechanical means you have probably not had much success. We have installed in our office a laboratory lathe which has the cleaning and polishing brushes attached and is used by the assistant every time an arch is removed from a mouth, which I believe should be done quite frequently. If you have not already adopted this plan I would suggest that you follow it.

Dr. Day: The rubber massage finger mould seems to be practical and I imagine would appeal to the average child and be very efficient in the average case if properly applied. The successful correction of malocclusion means co-operation of the patient and parent in the care of the case when away from the office, and that care constitutes oral prophylaxis in every detail and is of the greatest assistance to the operator. It is a point that should be thoroughly impressed upon the patient and parent. I believe every one of us here heartily agrees with the essayist in the many good points he has brought out and personally I wish to thank Dr. Bolton for the interesting paper.

Dr. A. A. Solley: I think if I could succeed in having my patients use the rubber finger massage my results would supersede those which I now secure with the brush. May I ask whether the practice of using silver nitrate during orthodontic operations is still followed?

Dr. Dunn: Some practitioners in the East are still using it.

Dr. C. O. Engstrom: We might expect the wearing of orthodontic appliances to aggravate some conditions which are influential in promoting oral infection, and our efforts should be toward the removal of all injurious matter in the mouth with as simple means as possible; such as, a small brush and plenty of water, allowing for a free and healthy action of the tissues of the mouth.

Dr. Bolton—(closing the discussion): I think the point I tried to bring out in my paper did not reach the mark. I do not believe it is the teeth that are the cause of systemic diseases except as they affect the soft tissues of the mouth, but I do believe that these soft tissues are the cause of many diseases in that the foci of infection are established in the mouth and the blood stream becomes contaminated with these micro-organisms directly from these tissues. Dr. Rosenow in his lecture at Seattle stated that the blind abscesses and pus-pockets were ideal places for the foci of infection of many systemic diseases. These rubber mats are not for teeth cleaning purposes but simply for gum massage.

REVIEW OF ORTHODONTIC LITERATURE FOR 1914.*

BY JOHN R. MCCOY, D.D.S., LOS ANGELES.

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I WILL endeavor to give briefly in this paper the salient points contained in the articles pertaining to orthodontia, which have appeared in dental periodicals during the past year. I will attempt to keep my own personal prejudices in the background and bring before your minds the various ideas in the light in which the authors intended them to be placed.

We will consider the articles as they appeared in the different dental journals, beginning with the

"Dental Cosmos."

February, page 137.—“The Pathologic and Therapeutic Possibilities of Upper Maxillary Contraction and Expansion.”—*G. V. I. Brown, of Milwaukee.*

Dr. Brown reports a number of experiments upon dogs, rabbits and guinea pigs, which confirm clinical observations on human beings. He believes that the most beneficial results can be accomplished by maxillary suture separation. A number of cases are reported where increased nasal breathing, with accompanying benefits, followed maxillary expansion.

April, page 435.—“The Possibilities of Research into the Etiology of Anomalies of the Jaws and of Malocclusion.”—*Professor Julius Tandler, of Vienna.*

Professor Tandler states that the lack of theoretic knowledge relates particularly to two points, viz.:

1. To the knowledge of the etiological factors causing malocclusion.
2. To the knowledge of that formal transformation of the skeleton, which we are enabled to obtain by therapy.

The essayist discusses etiological factors, including habit, constitutional factors and heredity. After discussing the enlargement of the nasal space by arch expansion, he adds: “After we are able to understand better the morphology and etiology of malocclusion we shall also be able to perform the treatment with better prospects of full success”.

May, page 551.—“Some Technical Suggestions on the Treatment of Malocclusion, Using the New Appliances of Dr. E. H. Angle.”—*Dr. E. Stanley Butler, New York.*

Dr. Butler's article is full of valuable suggestions as to the proper construction and operation of Dr. Angle's pin and tube appliance. The writer lays particular stress upon the following points, and advises all who operate the appliance to remember them: I.—Well fitted and thoroughly cemented bands. II.—Tubes parallel to the long axis of the teeth. III.—Neatness in soldering the pins. IV.—A positive anchorage; and, above all, V.—A thorough knowledge of the dynamics of the arch-wire, which can only be gained by constant study of its possibilities.

*Read before the Meeting of the Pacific Coast Society of Orthodontists, San Francisco, Cal., Feb. 22-24, '15.

June, page 665.—“Study of Normal Dental Arches and Normal Occlusion.”—*Dr. Bernhard Weinberger, of New York.*

Dr. Weinberger emphasizes the fact that one must have an intelligent conception of normal occlusion before he is able to correct that which is abnormal. He illustrates his paper with a great number of skulls and models, showing the various types of dental arches, and the relationship between the size of the teeth and the jaws. In conclusion he quotes the following from Dr. Angle: “To establish normal arches and occlusion, and retain the teeth in their normal positions, to maintain the balance and harmony that must exist, the full complement of teeth is necessary”.

July, page 825.—“The Diagnosis of Malocclusion of the Teeth.”—*Dr. Sheldon Friel, of Dublin.*

Dr. Friel suggests as aids in diagnosis, beside plaster casts, photography, prosopometers, and Grünberg's symmetroscope. He states, however, that Dr. Grünberg's instrument has failed in certain instances, so he uses a modified symmetroscope of his own design, which in principle is identical with Dr. Grünberg's. The writer brings out the fact that the position of the upper first molar in all cases, particularly when mutilated through disease, cannot be used as the key by which the jaw relationship is to be diagnosed.

August, page 954.—“The Relation of Internal Secretory Organs to Malocclusion, Facial Deformity and Dental Disease.”—*Dr. Clarence J. Grieves, of Baltimore.*

Dr. Grieves gives extensive data to prove the following:

1. That at least three of the internal secretory organs are necessary to the maintenance of life, and that nearly all preside over body growth, nutrition and metabolism.

2. That all of these tissues and glands are co-operative with, or compensate and inhibit each other in cycle.

3. That the normal development of the bones of the face and base of the skull and their proper articulation depends upon the correct functioning of these organs.

4. That there is an increasing percentage of malocclusion observed in both dentures, particularly the deciduous.

5. The hypertrophy of the pharyngeal and faucial tonsils is common in so many children with normal deciduous arches as to constitute primarily not the cause of malocclusion, but rather a coincident phenomenon.

6. That lack of use is recognized as a cause of maldevelopment, but the most important time for study of faucial and post-nasal growth is the period from birth to eruption of the deciduous teeth.

7. That organotherapy, when intelligently and conservatively exhibited, is said to have done much to correct these facial defects in certain cases.

8. That all statements relative to the internal secretory organs are to be accepted with the greatest caution.

September, page 1017.—“The Study of Some Etiological Factors of Malocclusion.”—*Dr. Milo Hellman, New York.*

Dr. Hellman discusses the primary etiological factors of malocclusion in a child, beginning with the germ-cell period, and carrying his discussion through fertilization, neofetal, fetal, and neonatal periods, birth, and the nursing period.

Particular stress is laid on the pernicious effects of bottle feeding. A "diagnostic chart" is presented, which, if the orthodontists used it to record each case, would present some interesting data.

September, page 1061.—"A Contribution to the Technique of Adjusting and Modifying the New Appliance."—*Dr. Robert H. W. Strang, Bridgeport.*

Dr. Strang discusses the fundamental principles upon which he has endeavored to build his own personal technique, and classes them under three heads.

1. The primary adjusting of the arch-wire should be along lines as simple as possible, and should contain as few variations from the plane determined by the position of the buccal tubes as is consistent with the malocclusion in the case at hand.

2. The form of the arch-wire after its primary adjustment should not be changed, and therefore from the start every precaution leading to accuracy should be enlisted.

3. As no accurate change can possibly be made without fixed indices as guides, these indices must be provided before the alterations are begun.

"Items of Interest."

February, page 91.—"Extending the Scope of Orthodontia."—*Dr. R. C. Willett, Peoria, Illinois.*

Dr. Willett relates his experiences in attempting to establish a practice limited to orthodontia in a small city. As in such a case one necessarily has to depend partly on the surrounding towns for practice, he believes that dentists in rural districts must be educated up to referring cases before the patient is too old to be benefited by treatment. He advises the reading of essays on the early recognition of malocclusions, etc., before rural dental organizations, but warns against the discussion of the technical phases of orthodontia.

March, page 176.—"Some Observations on the Development of the Temporo-Mandibular Articulation and Mandible, and their Relation to the Treatment of Distocclusion and Mandibular Retroversion."—*Dr. M. N. Federspiel, Milwaukee.*

Dr. Federspiel is of the opinion that the temporo-mandibular articulation develops in shape and depth during tooth eruption, and believes that the only cases of Class II in which treatment is successful are the ones which are treated during this period.

May, page 332.—"The Physiological and Pathological Resorption of Tooth Roots."—*Dr. R. Ottolengui, New York.*

Dr. Ottolengui gives the history of an interesting case where the erupting cuspids caused the resorption of the roots of the incisors. He compares this resorption to normal resorption in deciduous teeth and as widely differing from pathological resorption. Following this he gives his personal views on resorption, as well as Dr. Noyes' and Broomell's. The text is illustrated by some excellent radiographs taken by a number of different men.

June, page 416.—"A Looped Arch and Appliance for Attachment."—*Dr. R. D. Robinson, Los Angeles.*

Dr. Robinson presents an appliance on the same principle as Dr. Angle's

new appliance, only the attachment to the teeth is made by small blocks which fit into square tubes soldered to bands on the teeth. The essayist makes many claims of superiority for his appliance.

June, page 420.—“Bone Development as a Result of Mechanical Force.”

—*Dr. Martin Dewey, Kansas City.*

Dr. Dewey shows a number of excellent slides to illustrate bone growth in relation to the teeth. Skulls of similar animals are shown with and without the suture spread. Dr. Dewey does not think there is any advantage in the rapid opening of the suture over the slow movement, but believes the slow movement the most practical.

July, page 506.—“Compromise Treatments.”—*Dr. Lloyd S. Lourie, Chicago.*

Dr. Lourie’s paper brings up the following questions for discussion:

1. Is it possible in all cases to place and retain all of the teeth in their normal anatomical relations?

2. Even though ultimately possible, is it always advisable to attempt it?

The doctor assumes the negative view, and shows a number of casts in substantiation of his views.

December, page 887.—“The Practical Application of Our Knowledge of the Resorption of the Roots of the Permanent Teeth.”—*Dr. R. Ottolengui, New York.*

Dr. Ottolengui discusses the physiological and pathological resorption of roots of teeth, and advises caution in the movement of teeth where there are unerupted adjacent teeth, which by their traumatic influence cause absorption. The text is illustrated by a number of radiographs.

“Dental Review.”

August, page 753.—“Diagnosis by the General Practitioner as a Factor in Preventing Deformities of the Jaws and Face.”—*Dr. F. C. Rogers, St. Louis.*

In a brief article Dr. Rogers points out some of the underlying factors operating to produce deformities, and emphasizes the fact that general practitioners should make an early diagnosis of malocclusion, as the longer the treatment of a case is delayed the more it assumes a serious aspect.

“Dental Summary.”

May, page 354.—“A Comparative Study of the Methods of Expansion of the Dental Arch Relative to the Mechanical Principles Involved.”

—*Dr. Herbert A. Pullen, Buffalo.*

Dr. Pullen enumerates the many advantages of the newer simplified appliances against the antiquated and complicated ones. The writer discusses the laws of dynamics and physics in their bearing upon appliances used for the purpose of expanding the arch. He commends Dr. Angle’s new “pin and tube” appliance, which accomplishes stationary anchorage as well as bodily movement of the teeth.

May, page 376.—“An Orthodontia Appliance for Bodily Movement, Eliminating Ligatures.”—*Dr. W. E. Newcomb, Cleveland.*

Dr. Newcomb presents an appliance for which he makes no claim of originality, an appliance which secures bodily movement of anterior teeth

by a double arch wire, banded with tubes soldered to the teeth and a pin which slides into the tube from above, and hooks over the upper arch. He tells of the good results obtained, and emphasizes the ease of construction and small expense incurred.

October, page 801.—“Essential Considerations Regarding the Teeth and Force Involved in the Study of Orthodontia.”—*Dr. L. G. Singleton.*

Dr. Singleton discusses the part played by heredity and environment in tooth and arch forms. He backs up Dr. Angle’s theory that the teeth and jaws in any type of face bear a definite relation to the architecture of the skull.

December, page 941.—“The Value of Orthodontia Treatment to Certain Types of Backward Children.”—*Dr. George F. Burke, Detroit.*

The doctor emphasized the fact that malocclusion means malnutrition, and malnutrition means arrested development and greater susceptibility to disease. He makes a plea for a more thorough mastication of food, and points out the many benefits derived therefrom.

A REMOVABLE LINGUAL RETAINING WIRE.

BY ADELBERT FERNALD, D.M.D., BOSTON, MASS.

THE ADVANTAGE of the lingual retaining wire over the old style “roof-plate” has long been conceded. However, the construction of the lingual retainer, when soldered to bands, required considerable technical skill, which could be easily acquired; but one of the great disadvantages of the fixed wire was its firmness of attachment. If one of the bands became uncemented, it was generally necessary to remove the other bands to recement the one that was loose. This often resulted in more or less destruction of the bands, which were forcibly removed, and consumed a great amount of time and inflicted more or less hardship upon the patient. Therefore, during the last few years many forms of removable lingual retaining wires or arches have been advocated. The one I am presenting has been found very satisfactory in my practice.

The section of the enlarged model (Fig. 1) shows some of the principles of construction. The large tin portion of the model (A) represents the molar band, with a piece of triangular open tube soldered to the lingual surface of the molar band. The round end of the wooden part represents the distal portion of the retaining arch, to which is soldered a triangular post (B) which fits into the tube soldered to the lingual surface of the molar band. On the upper end, or more correctly the gingival end of the post, is filed or cut a notch which catches over the gingival portion of the tube, on the surface of the tube which is against the tooth. This notch in the post catches on the edges of the tube and locks the post in the tube which holds the posterior end of the arch in position.

I have the posts and tubes made of German silver and platinum and gold. The tubes are made in two sizes, the smaller one fitting accurately inside of the larger one. By flowing a little solder between a section of the

large and small tubing; thereby uniting one to the other, I have a tube which is very strong. By placing flux on the outer side of the small tube and inserting it inside of the larger tube, and by having the section of the small tube slightly longer than the large tube, a small piece of solder can be laid on the small tubing and after carefully heating over a small pointed flame, the solder can be "pulled" between them. When united in this manner, they seem to be stronger than if they had been made in one piece.



Fig. 1.

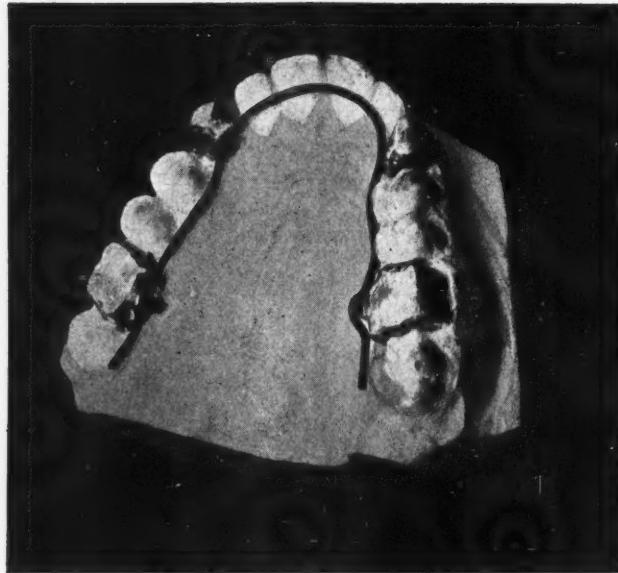


Fig. 2.

Fig. 2 shows the attachment of the tube and post and also the position of the lingual wire in the molar region. Bands are placed on the canines and a short section of the small tube is soldered to the lingual side of the canine band at right angles to the long axis of the tooth. This section of tube is opened to form a "U" which receives the lingual arch in the canine region. If the canine band is soldered on the lingual side, a notch can be

filed or cut in the seam to take the place of the "U" tube. If it is desired to retain the mesio-distal relation of the canines, as is often required when all of the permanent teeth are not present, small lugs can be soldered on the lingual arch so that they will occupy mesial and distal positions to the "U" tube or edges of the notch which has been filed in the seam of the canine band.

In Class II, Division 1 cases, to retain the normal position of the upper anterior teeth, a small section of square tubing, 23 gauge, is soldered on the mesio-labial angle of the canine band, parallel with the long axis of the tooth. A square wire, the ends bent at right angles to fit the square tubes on the canine bands, is fitted to the labial surface of the anterior teeth, as shown

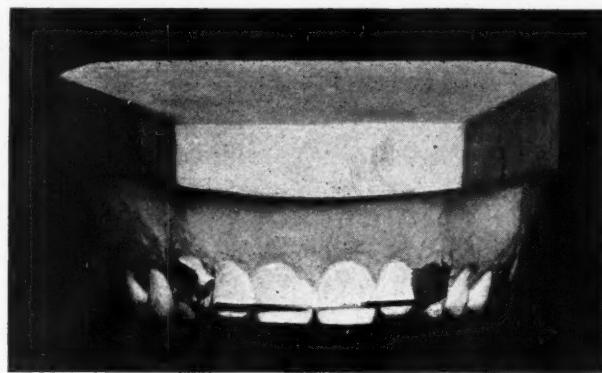


Fig. 3.

in Fig. 3. By the use of square tubes and wire on the canines, the canines are prevented from rotating. For the attachment of the intermaxillary rubbers, small hooks are soldered on the disto-buccal angles of the canine bands.

If at any time it should be necessary to examine or clean or fill the teeth, the labial and lingual wire can be easily removed. Should it be found that there was not enough spring in the lingual arch to retain the relation of the teeth, the arch can be removed and more spring placed in it, thereby making an active intramaxillary retainer.

This form of removable retaining wires will also be found of value as a prophylactic aid. The wires can be removed and the teeth cleaned and polished.

CURRENT ORTHODONTIC LITERATURE

EDITED BY H. C. POLLOCK, D.D.S.

Child's Health and Beauty as Influenced by the Occlusion of the Teeth.

This subject was presented by H. Clay Ferris, D.D.S., M.D., before the Southern Dental Society and published in the *New Jersey Dental Journal*, April, 1915. Dr. Ferris introduces his remarks by the statement that this subject has been neglected in the study of the "healing art" and like all discoveries through scientific observation causes wonder why one has not observed its importance before. The Doctor says in part:

A few of the principal points which I wish to emphasize in this short treatise, are: First, a recognition of the order of the forces which produce the greatest influences over the development of the bones of the face and jaws; second, the value of the inclined planes and the size of the roots in proportion to the crowns and their accompanying periodontal membrane; third; the mechanical value of nature's plan for the reduction and insalivation of food in the shortest space of time; fourth, the influence of this masticatory force upon the bones of the brain case, which manifests itself in the highest degree of beauty for any type; fifth, the importance of the mouth in digestion of food for the aid of further digestion and assimilation; sixth, Edward H. Angle's classification with some practical illustrations from life.

That you may better follow me, I will carry you hurriedly through the anatomy of this part of the body. Here we will have presented the muscle mask of the face. You will note how the muscles about the mouth and eye are connected with fibre of other muscles, so that the movement of one influences the other. The position of the bones to which the muscle mask of the face is attached, alters the expression, and this expression cannot be normal for the type of the individual unless the bones underneath the muscles fill the position that nature devised for its particular architectural plan. It is unnecessary to state that normal occlusion of the teeth is bound to develop in the normal subject if the organism is not interfered with by habits, abnormal environment, or loss of function of any of its parts.

I will illustrate the manner in which these teeth grow, and show how the forward part of the face is developed at a particular period in the child's growth, and then show how this development is interfered with by extraction of the deciduous teeth, because of the failure of the normal forces, incident to tooth eruption in the distal parts of the jaws, to carry the previously erupted teeth forward. These teeth erupt through the blood pressure underneath their crown, and are forced upward and downward between the dense bone in the posterior and the newer bone in the anterior region, resulting in normal development of the face and jaws at maturity.

This process of nature is necessary in order to overcome the backward pressure that is produced by the muscle mask of the face, and the crowding out or impaction of the wisdom teeth, which seems to be prevalent in the

practice of our oral surgeons today. I will illustrate a little later how the whole arch may be retracted by the removal of one or two teeth in the distal part of the mouth, or in exceptional cases during the growing period, over-developed muscles through excessive exercise, habits, or the pressure of a cornet against the arch may overbalance the force of the forward thrust of the third molar and cause its impaction.

During the eruption of the baby set of teeth, if the child has an obstruction in the nose and is compelled to breathe through the mouth, we must naturally expect that the perversion of this great force will result in abnormal development of the bones of the nose and the face, which carries with it the teeth. If the abnormal nasal conditions are corrected, and the child is fed on hard substances, dried crusts, instead of milk-toast, and predigested foods, there will be a normal development of these bones, which results from increased circulation of blood by exercise of the part, except in congenital cases.

You cannot develop the muscles of mastication through this exercise without developing the bone; otherwise the muscles would become so strong that they would tear the bones of the face to pieces. The normal pressure occasioned by proper locking of the teeth, also stimulates the salivary secretion; and, as Professor Pavlov has shown us, it excites the primary flow of the gastric juice and its consequent effect upon the digestion.

If this advice is neglected, you are just as likely to have deformity in the baby set of teeth as you are in the permanent; and if you have it in the former, you will surely have it in the latter, for you will have lost ten years of the growing period of this animal which has but twenty-one years for his full development.

As the permanent molars erupt distal to the deciduous teeth, you will see the necessity of preserving each one of the latter in their normal position. If they should decay, they must be filled. If they are lost, something must be substituted to maintain the continuity of the arch. This may be a metal bar attached to one end. They should not be treated as some of the textbooks used in the public schools instruct the children—that is, "allow them to decay until the permanent ones come in," or have them extracted prematurely—but nature should have a chance to perform its work.

Orthodontic operations are showing wonderful results by returning the parts to their normal positions, but it is seldom that the ear-marks of this lack of development are eradicated, even after the orthodontist's best efforts have been expended, unless these conditions have been detected in the baby set of teeth.

If we had the extreme sense of proportion that artists are obliged to have, we could build an entire structure around the pattern of the superior central incisor tooth when it erupts in our child's mouth at ten years of age, for it is the only part that will exist at maturity, for the tooth grows in length only, after its eruption through the gum, and gives us the first indication of his finished structure.

The mother's instinct seems to run in advance of science, and she frequently takes her child to a dentist or physician and asks that something be done for her baby with crooked teeth. The dentist oft-times advises the

former to postpone treatment until the child is twelve years of age or until the eruption of the second molars.

The physician too frequently advises the mother to wait until the child becomes stronger in order that he may bear the nervous strain of the operation. But by placing the baby teeth in their proper mechanical and muscular influences, you benefit by the number of years of the growing period of the child's life. The bones of the younger subject being less ossified, are more readily moulded into their normal form.

The answer to the physician's argument is, that owing to the lack of development of these bones, the teeth are retarded in their effort to erupt, and this interference produces such disturbances in the fifth pair of cranial nerves, that we frequently have cerebral manifestations with all their reflexes until the eruption of the teeth.

Cases of epilepsy or convulsions are often relieved by lancing a baby's gums or expanding these arches for easy tooth eruption. The blood pressure of the child should be watched and brought to its normal height to hasten their development.

We can liken this condition, then, to the placing of the child's arm in a vise for the same length of time that we are retarding development of his teeth. If that period be six years, the child's system will be continuously under a nerve tension, owing to the interference with the growth of the part; furthermore, his want of ability to reduce his food and perform the function of mastication will have told upon the digestive apparatus, so that he will be underdeveloped as a result of disturbed metabolism.

An early treatment will show the reverse of these conditions. The child will grow in weight during this operation, and the discomfiture to him of the mechanical apparatus inserted for the purpose, is reduced to a minimum. The operator finds the work in this field play, both for the child and for himself.

There is still a more important fact, and that is that the upper jaw articulates or comes in contact with thirteen bones of the cranium, and the under jaw in contact with two bones of the cranium; therefore, any mechanical interference with the development of the maxillary bones influences the shape of these structures which form the brain case, the orbits and antra.

In order to prove this assertion, Dr. Lawrence Baker, Assistant Professor of Orthodontia of the Harvard Dental School, carried out an experiment with two rabbits of the same age. From one he extracted all the teeth on one side of the lower jaw. For a period of a few months the two rabbits lived together on the same food. They were then killed.

The normal or control rabbit's skull developed uniformly. The operated rabbit, being minus the functioning powers of mastication and the stimulus of muscle pull, had all the bones of the cranium of the defected side undeveloped; and there was a curvature of the central line in all the bones of the unaffected side. The ribs of the operated side and the sterum of the animal showed marked lack of development. The importance of this observation needs no explanation—it speaks for itself.

Delaying the treatment of these conditions of the teeth will have a lasting influence upon the development of the brain-box. We can reasonably conclude that the brain of an individual type, from any species, should

normally develop to a given size. If this growth is retarded by lack of development and function of the teeth, the brain-box must be more or less influenced in its development. Being in possession of these facts, we are neglecting our children if we do not protect nature's forces in their early growth. A nervous irritability and a lowered scholastic ability have been observed in certain forms of malocclusion. A correction of these deformities has an immediate beneficial result on these manifestations.

Has your child a beautiful face? No? Why not? You are a good-looking man, and your wife is beautiful; why should your offspring be uncomely?

You say that you are not good-looking, and your wife is not beautiful, but you have in your collection the pictures of your grandparents who were handsome. They belonged to a strong type, their faces bespeaking character, determination and intelligence.

Is your type degenerating, or is this physical condition due to environment and neglect of nature's laws? You may have been better educated than your grandparents, but you have a dejected countenance which belies your intelligence. There is a commercial value in a face. If you doubt this, ask the man who employs you. Ask the man who is looking for a wife.

Do not forget the message that I bring you: A perfect head and face for the type of your child can be developed through the exercise of the organ of mastication, and your child can chew himself into healthy development.

Dental State Board Questions and Answers.—By R. Max Goepp, M.D.,

Author of Medical State Board Questions and Answers. Octavo volume of 428 pages. \$2.75 net. W. B. Saunders Company, Philadelphia and London.

Goepp's "Dental State Board Questions and Answers" is more than the name implies. While the book is made up from the examination questions that have been asked by various State Boards, each subject is treated in such a manner that the book can be used to review a subject and enable the student to get some idea in regard to the manner of making concise and short answers that are complete. We have observed that the average student may have a very good idea of a subject but still be unable to answer a question on that subject in a short answer. A careful study of this volume will tend to overcome this trouble, if the student does not make the mistake of trying to remember the answer instead of learning the subject and the manner of framing the answers.

Each subject is carefully covered. Chemistry is given under the headings of inorganic, organic, and physiologic, followed by some good questions and answers on metallurgy. Dental anatomy is considered under the heading of general anatomy and the questions are sufficient to cover the needs of the average State Board. Very little is given on the shapes of the teeth, or the occlusion of teeth. The medical branches are given more space than the subjects of orthodontia, operative and prosthetic dentistry. This cannot be called a fault of the book, for most students are better prepared to pass examinations on the dental subjects than they are along medical lines. For the purpose of reviewing a subject the book is well suited, but it is hoped the student will not attempt to use it as a text.

EXCERPTS

A Case of Normal Development.—A paper of much interest and value to orthodontists was presented by Harold Chapman, L. D. S., Eng., D. D. S. Penn., published in *Dental Record*, and read before the British Society for the Study of Orthodontics, at the December, 1914, meeting.

It will be remembered that in February, 1911 (*vide* B. S. S. O. Transactions, April and May, 1911), Dr. Sim Wallace presented a communication to the Society entitled "A Note on the Normal Development of the Jaws." This note referred to an increase in the width of the jaws, as measured from the buccal surfaces of the second upper deciduous

molars, of a particular case. The increase, the amount of which is not stated, took place between the ages of $3\frac{1}{2}$ and $9\frac{3}{4}$.

The case which I present this evening is a very similar one. The relation of the lower to the upper jaw, as diagnosed by the second deciduous molars, is normal.

The earlier casts show the boy's dental arches at four years of age and the later ones the same arches at nine years and two months—the incisors are the only deciduous teeth which have been replaced by their permanent successors.

The following table gives the various measurements and the increase in width which has taken place:

Width of Dental Arches between		1st Casts	2nd Casts.	Increase in width.
1. Extreme buccal width.....	$c \mid c$	36.9	40.3	3.4
	$\overline{c \mid c}$	30.0	34.0	4.0
2. Buccal surfaces of.....	$d \mid d$	44.0	46.2	2.2
	$\overline{d \mid d}$	36.8	38.6	1.8
3. Occlusal sulci of.....	$e \mid e$	41.0	43.2	2.2
	$\overline{e \mid e}$	—	—	—
4. Buccal surfaces of.....	$e \mid e$	48.8	51.0	2.2
	$\overline{e \mid e}$	45.0	46.8	1.8
Average				2.5

The main facts are:—

1. The Canine Region. An increase of 3.4 mm. in the upper canine region and 4 mm. in the lower canine region; the greater buccal movement of the lower canines has resulted in these teeth now being edge to edge with the corresponding upper teeth. From the appearance of the cast it might be assumed that this great increase in the lower canine region is intensified by the approaching loss of these teeth; that it is by no means the sole cause is proved by the great amount of attrition. Whether the former is an important cause or not is of less importance than the fact that the increase in width in this region is greater than in any other and it is my belief that very closely connected with this fact is another—the absence of all irregularity. If the cause of the widening in the canine region—or rather of the opposite, the

cause of lack of widening at this point, could be definitely stated, a long stride in the elucidation of etiology would have been made.

2. The Deciduous Molar Region. An increase of 2.2 mm. in the upper second deciduous molar region and one of 1.8 mm. in the corresponding position in the lower jaw. On checking the figures a greater increase in the width of the upper than of the lower jaw was constantly found. This I assume to be the result of a slight forward movement of the mandible. (It must be borne in mind that as regards the relation of the lower to the upper dental arch, the effect of a forward movement of the mandible and lower teeth, as one, is the same as an increase in the width of the lower dental arch if the mandible remained stationary.) This lesser increase in the lower than in the upper I assume to be accounted for

by a slight forward movement of the mandible and, with it, of the lower teeth. It is a point about which there might be some controversy, but, in addition to other facts, these figures give some support to the theory; in this case such movement is better seen on the right side.

The average increase in width of the two jaws in the canine and molar regions is 2.5 mm., or 2.0 mm., if the canines are not considered. From the illustration of Dr. Sim Wallace's case I judge that in the two cases the increase is about the same. When one makes measurements such as have been referred to, it is found to be exceedingly difficult. I have checked the figures very carefully and consider the differences may be regarded as accurate, and it is the differences between the two sets of casts that are of importance. Similarly, it is very difficult to show that a forward movement of the mandible has occurred; a very slight movement is sufficient to account for the observed differences.

Having stated the points to be observed by an examination of the casts, further details of the history of the case will be of interest.

The child was breast-fed for five months and has always been a nasal breather. He has had a considerable amount of fruit, especially apples, included in his diet, but he has not otherwise had much in the way of hard food, such as toast and crusts; for these latter he has a dislike.

To exemplify the fact that fruit occupied a prominent place in the diet of this boy and his younger brother, I will quote a rhyme composed by the latter when he was five years old:

"An apple a day keeps the doctor away;
An apple at night keeps the dentist from sight."

The composer is almost entirely free from caries.

To return to the history: The tongue is well developed and the deciduous teeth, especially the canines, show that a considerable amount of attrition has taken place. The amount of the overbite is, in my opinion, correct; as shown by the cast taken at four years, the upper incisors overlap about one-half the lower incisors; it will be of interest to note this point when all the permanent teeth are *in situ*. The mouth is clean as one would ordinarily speak of it.

The case differs greatly from Dr. Sim. Wallace's in that there is a considerable amount of caries, all the deciduous molars and lower canines having been filled. In view of this factor it cannot be regarded as a typically normal case. Can it be that the diet required the use of sufficient force to masticate it to insure the proper development of the dental arches, but that the order in which it was consumed was not such that the fruit sufficed to keep the teeth free from caries? The history of the case clearly stated that the fruit was not taken at the end of a meal, but "indiscriminately," if one may express it so. This is a simple and satisfactory explanation of a well-developed denture at this age, according to Dr. Sim. Wallace's view; but it might be argued that at whatever stage of the meal fruit is taken its effect in producing a normal flow of saliva, which along with the fruit is regarded as an active agent in the prevention of caries, will be the same. This case should also be of interest to Mr. Rushton, for he stated in regard to Dr. Sim. Wallace's case that "the arch was well developed, chiefly because the child breathed through his nose and not through his mouth." By accepting these views the normally developed, but carious denture can be satisfactorily accounted for.

In this connection Mr. J. G. Turner's cases, in which there was neither nasal nor mouth breathing, of well-formed dental arches are recalled. In one a boy had breathed through a laryngotomy tube from a very early period. The inference is that neither mastication nor nasal breathing is of supreme importance but what does matter is that there must not be any mouth-breathing. Nevertheless I would not have it thought that I advocate a diet which does not require mastication or that I recommend the wearing of a laryngotomy tube. Whilst thinking over this subject the report of the committee on "The Etiology of Contracted Arches" also comes to one's mind. It was illustrated by a number of casts of the jaws of mouth-breathers, and the common feature of these is narrowness in the upper canine region, without prominence of the upper incisors, so it would appear that lack of width in the canine region, unaccompanied by prominent incisors, is more frequently coexistent with or follows mouth-breathing than the grosser deformities which have been described as resulting

from mouth-breathing. This is certainly in agreement with Mr. Rushton's statement.

As a matter of interest and for purposes of comparison, I will put the casts of the younger boy in the epidiascope; they show his dental arches at three years and seven months. He was born eighteen months later than his brother and as regards diet, that has been the same; but the case belongs to (Angle's) Class II, Div. 1. There is also an excessive overbite, the edges of the lower incisors just touching the soft tissues behind the upper incisors. Further etiological factors must be sought in the following history. He was born at six calendar months; was breast-fed for five weeks; he always had a comforter up to about two years. He has mouth-breathed a little. It apparently started after he left off the comforter and continued until adenoids were removed about three months ago, when he was eight years old. If one met the boy he would not be taken for a mouth-breather but regarded as a particularly bright and intelligent youngster; so I take it that the description "he mouth-breathed a little" is substantially accurate. In this case no expansion took place in the upper second deciduous molar region between the ages of 3-7/12 and 8 years, but during the last fourteen months, an increase of 1.8 mm. occurred in the width at the point referred to.

Prevention of Malocclusion.—More and more attention is being attracted toward the prevention of malocclusion of the teeth and the early recognition of conditions deviated from the normal early in life. B. Frank Gray (*Dental Summary*, May, 1915), presents this subject in a very plain and interesting manner. He says malocclusion of the teeth should be prevented, that the prevention of malocclusion is entirely practical and possible, and every practitioner of dentistry should be keenly alert to this situation.

The teeth of the deciduous denture *must* be kept healthy and intact for their normal period of usefulness. Under no circumstances may a first or second deciduous molar be allowed to decay or be lost prematurely. If, unfortunately, such a tooth *is* lost, its space must be retained mechanically until the succeeding tooth erupts. Once the first permanent molar drifts forward into the space of the second

deciduous molar, a basis of serious malocclusion is established.

What has been said of the deciduous molars is quite as true of the deciduous incisors and canine teeth.

Orthodontists are continually expending their efforts to overcome the influences of neglect. Every dentist should have definite knowledge as to the average normal period of life of the deciduous teeth, and see that they are retained approximately that time—or indeed until the succeeding tooth is clamoring for eruption.

Again, in a few cases, the deciduous tooth, for some reason, is prone to remain too long in its position. The reasonable procedure in such a case is to determine, by means of skiographs, the process toward eruption being made by the permanent tooth. If well along toward eruption, and the age of the patient indicates its wisdom, let the deciduous tooth be removed.

Strangely enough, the deciduous denture of some children (say at the age of four to seven years) is much under-developed. As the child approaches the period at which the permanent incisors should erupt, there should be in evidence a constant widening of the dental arch, and the so-called normal "*growth-spaces*" should be appearing between the deciduous incisors and canines. In many cases these "*growth-spaces*" are wholly lacking. This, of course, means that the permanent incisors, with their greater width, cannot possibly find accommodation in the space occupied by the small deciduous incisors. So here is an opportunity for prevention that should not be overlooked. Gentle mechanical stimulation of the development, laterally, of these arches, should be resorted to, even at a period two or three years previous to the appearance of the permanent incisors. Dr. Barnes, of Cleveland, has called such particular attention to this, that surely his name should be mentioned in this connection.

In dealing with malocclusion, the advice to wait until all the permanent teeth have taken their positions, Dr. Brady once said, is equivalent to telling the parent to allow the case to get as bad as it possibly can get before making any effort to correct it. The successful treatment of malocclusion, which is at all complicated, is *tedious and exacting*, and requires a quality of persistence and fitness on the part of the operator that is only fully realized by

those who have actually engaged in the work. Any fee that will compensate the operator, even in a modest degree, for his services, may prove a burden to the parent, if indeed, the orthodontist is not accused of "highway robbery". A child of twelve or fifteen years of age, with much irregularity, requires a treatment period of the greater part of one year, with a succeeding retention period of two years' time.

Because of the requirement as to time, and the consequent fee demanded in these established or somewhat "mature cases," only one out of the many can ever be treated. Possibly one out of seventy-five or a hundred cases only, will have the services of the orthodontist—and in communities where there is no specialist the proportion of treated cases is practically nil. The result is that hundreds of thousands of children all over the land must go on through life with varying degrees of dental and facial deformity, much of which could have been prevented by the intelligent co-operation of the family dentist.

In filling teeth with gold, certain well-defined principles are adhered to in order to arrive at a certain degree of success. So, out of all the chaotic beliefs with reference to treatment of malocclusion of the teeth, certain well-defined basic principles have finally been accepted by those who have thought most upon the subject. The great fundamental in orthodontia is *normal occlusion!* To work to any other principle is to acknowledge a degree of defeat at the outset.

A brief resume of the avenues of prevention of malocclusion might, therefore, be as follows:

a—The preservation of the deciduous teeth for their normal life period.

b—The mechanical retention of the space if the deciduous tooth be prematurely lost.

c—By noting the deciduous teeth are not retained for a considerable longer time than is normal.

d—By stimulating the lateral growth of the deciduous dental arches when the normal "growth-spaces" are not in evidence, say, at six years of age.

e—By paying some attention to the

nasopharynx and nose to see that the child has no occlusion of the air-passages.

f—By bearing in mind that prevention is better than cure.

g—By remembering the best time to correct malocclusion is *now!*

If the question be asked: What mechanical procedures may the general practitioner follow in dealing with incipient malocclusion?

First.—Where the second deciduous molar, for instance, is lost, he may fit and solder a band to the first permanent molar; another to the first deciduous molar; connect the two bands by means of soldering a strong wire between them, and cement the little appliance thoroughly to place. Inspect it at intervals of three months until the second bicuspid makes its appearance.

Second.—The dentist may stimulate the lateral development of crowded deciduous arches by means of bands fitted to the cuspid teeth on either side, to which a soft lingual wire is soldered, the ends passing a bit distal to the cuspids, to engage the lingual aspect of the first deciduous molar. With a suitable wire-stretching device the wire may be gradually lengthened, thus securing a considerable degree of expansion of the anterior part of the arch. This method will not successfully move both crown and root of the cuspid, as may be done by some of the newer methods.

Third.—The dentist may note the influence of an abnormally attached frenulum-labium in causing serious separation of the permanent central incisors, and may, by following a fairly simple technic, put an end to the abnormal muscular attachment, with the electro-cautery—drawing the teeth together and retaining them pending the eruption of the lateral incisors.

Fourth.—If the dentist considers this work, even in its simpler phases, undesirable or burdensome, in most communities of considerable size he may co-operate with a specialist. In any event, let us not unthinkingly pass by conditions, which in their incipiency work no great ill, but the neglect of which is fraught with consequences which scarcely the full purse of the patient and the skilled hand of the operator may fully correct.

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EDITORIALS

Mechanical Forces in the Development of Bone.

IN no branch of medicine has greater progress been made than in regard to the development of bone. The publication of William Macewen's observations on the osteogenesis of bone, entitled “The Growth of Bone,” has made it necessary to revise many of the old ideas which were held in regard to the function of the periosteum of the bone and the regeneration of bone. Clinical observations made during the treatment of orthodontic cases, based on a knowledge of histology, lead Dr. F. B. Noyes to make the statement that “bone developed as a result of mechanical stimulation.” This statement has been disputed by a number of men who have failed to disprove the statement or to produce any better argument as to why bone develops in the manner it does. In fact, modern orthodontia is based upon the belief that bone development can be stimulated by mechanical appliances, and we have often seen results which could not be explained any other way. However, we are aware that it is often “easy to see what one wants to see”, but when you find that investigators in other lines of work see the same thing, the thing must exist.

Sir Arbuthnot Lane, Bart, F.R.C.S., in a paper read before the British Society for the Study of Orthodontics and published in the *Dental Record*

(London) January 15th, and subsequently published in the April issue of the International Journal of Orthodontia, makes some statements that require more than passing notice, for they have a direct bearing upon many of the modern orthodontic problems, both in reference to bone development and etiology. He states the fundamental law that "the skeleton represents the crystallized lines of force. When force is exerted in the same direction it is laid down as compact tissue, when in various directions as cancellous tissue." This theory would indicate a belief that the entire skeleton had been influenced by mechanical force and stimulation. If force has played such an important part in the development of the skeleton, it is to be expected that a great amount of development could be accomplished by the proper application of force in a limited area. The problem of modern orthodontics is the application of this force.

Sir Arbuthnot Lane also lays great stress upon the development of the nasal cavities as a result of the pressure exerted by the passage of air through them. This supports the contention of the orthodontist, that the development of the maxillary dental arch is dependent upon normal breathing. We see a great many cases of narrow upper arches which have been caused by the lack of atmospheric pressure; the failure of the superior maxillæ to develop because of a lack of the expansive force of the air passing through the nasal tract; yet in the face of these clinical cases and the arguments made by Sir Lane, there are still many practitioners in the profession who claim that atmospheric pressure has nothing to do with the development of the nasal and oral cavities. It was only recently that the statement was made by a prominent authority that the nasal and oral cavities would develop normally if the teeth were used, even if the child never breathed through the nose. This may be true in those patients who have managed to live for years after having tracheotomy performed, who have still used the teeth. However, that condition is very different from the ones we find in mouth-breathing, for the patients who have had the tracheotomy done are able to breathe with the mouth closed and would not suffer from the perverted action of the muscles, which we find are abnormal in the mouth-breather. If mechanical stimulation and muscular forces caused the bones to develop, if atmospheric pressure also plays a part, the normal dental arches are the result of the sum total of all of these forces. Those who claim that mouth-breathing causes all malocclusions are equally in error with those who claim all malocclusions are the result of lack of use. The lack of any one mechanical force will probably produce malocclusion. If a patient breathed through the mouth and used the teeth as much as he should, there would be a malocclusion because of the imperfect and abnormal forces of the muscles of respiration. If the patient was a normal breather and did not use the teeth, there would also be a malocclusion, but it would be a different type from that which would develop in the mouth-breather. Lack of mechanical forces and perverted mechanical forces both play a part in the development of malocclusions.

The effect of artificial forces or those forces which are exerted by an appliance in distinction to the natural forces has long been a question of dispute. There seems to be no doubt that bone can be made to develop in the neighborhood of a tooth which has the proper artificial force applied to it.

Different degrees and different manners of applying force will also cause bone to be laid down in different arrangements. The fact that bone can be made to develop by the application of force was taken advantage of by those who advocated the opening of the intermaxillary suture for the increase of the nasal space, and by those who were going to develop bone for the retention of teeth. Both were right in the advocation of the growth of bone, as it has been proven that bone will develop in the intermaxillary suture that has been opened, also that bone will develop around a tooth that is moved. It has also been proven that this bone will be absorbed as soon as the mechanical force is removed. Why? Because the bone has developed as a direct result of some mechanical stimulation and when the stimulation is removed the bone is again absorbed. The solution to the retention of the teeth is not the artificial development of bone, but the stimulation of all of the natural forces which will keep the bone that is there and continue to develop new bone. No tissue is more changeable than bone and the stimulating force of the regulating appliance must be the same as will be exerted by natural forces. When this is done, few relapses will occur after the appliance is removed.

Oral Hygiene and Orthodontia.

DURING the last few years no branch of dentistry has made such rapid advance as oral hygiene. In fact, so much has been said in regard to this subject that some might think it is something entirely apart from dentistry and was some sort of science, while the fact of the matter is that oral hygiene is intermingled in every branch of dentistry. Some few months ago, a conversation took place in regard to a man who was going to specialize in orthodontia and prophylaxis. One orthodontist remarked that everyone practicing orthodontia should also practice oral hygiene or prophylaxis. It is also a fact that many engaged in the practice of oral prophylaxis condemn those who are practicing orthodontia for not observing oral hygiene and prophylaxis more carefully. What, then, is the exact condition that exists between orthodontia and oral hygiene or prophylaxis? Is it a fact that the men who are engaged in the practice of orthodontics do not observe oral prophylaxis?

To begin with, there is no branch of dentistry that has a more direct bearing on oral hygiene than orthodontia. When we consider that teeth which are in malocclusion cannot be kept clean as they have abnormal contact points, when we examine a mouth with a large number of approximal cavities which have resulted from the malocclusion and the impossibility of the patient to keep the teeth clean, we must admit that anything which will remove the malocclusion of the teeth will render a great prophylactic service to the patient. Again, when prominent men who are engaged in the practice of treating pathological conditions of the gums and associated structure make the statement that seventy-five per cent of the so-called pyorrhreas have as their predisposing cause malocclusion of the teeth, we must admit that orthodontia should be one of the greatest factors in aiding oral hygiene.

The statement has been made that regulating appliances cause the teeth

to decay and that the bands and ligatures injure the gum and periodental membrane, all of which has been true in some cases. However, when such conditions arise, it is the fault of the operator and not of orthodontia as a science. We have seen mistakes made in dentistry, medicine and surgery, but we cannot condemn those sciences as a whole because certain practitioners have erred.

Every man practicing orthodontics should also practice and preach oral hygiene and prophylaxis to his patients. Every patient should have the teeth cleaned at stated intervals and in our practice those intervals are about every time we see the patient. The patient should be instructed as to the proper care of the teeth, but the orthodontist should keep the teeth clean.

Sometimes, in spite of everything that can be done, some of the teeth decay during treatment. These cavities should be only those which occur in a large number of mouths regardless of whether or not the teeth have had an appliance adjusted. However, should a tooth decay, the parent is often prone to blame the appliance; some dentists are anxious to have the appliance of the orthodontist take the blame. We generally answer such arguments with the statement that many teeth decay in the mouths of patients who have never had a regulating appliance adjusted. If teeth decay when no appliance is on them, why should they not decay when an appliance is in place? In fact, it has been our observation that there is far less decay of the teeth among orthodontic patients than there is among patients who are not undergoing orthodontic treatment. This is because of the fact that orthodontic patients pay greater attention to oral hygiene than most other people.

The question of the material used and the manner of construction of the appliance plays an important part. Whether the appliance is fixed or removable, it should be made so that the teeth can be cleaned. All bands should be so constructed and cemented on the teeth in such a manner as to avoid injury to the periodental membrane.

If proper care is observed during treatment, there should be no more decay of the teeth than would occur if no appliance was adjusted, and there should be no inflammation of the surrounding parts.

Orthodontia is and should be the greatest aid to oral hygiene and prophylaxis.

The Periodental Membrane and Alveolar Process.

IN several papers and discussions before dental societies, which have been published of late, much has been said in regard to the periodental membrane and alveolar process in health and disease. The opinion seems to prevail among certain practitioners that if these tissues are ever destroyed they will not rebuild. Some of the methods of treatment of diseases of the gingival tissues are based on that view, with which it seems many of us do not agree. One writer has advocated that if the periodental membrane is destroyed, the process will be lost with it, because the process is built up by the periodental membrane. It is true that whatever destroys the periodental membrane will almost always destroy some of the process also. This

is because of the intimate relationship of the parts, and not because the alveolar process is built by the peridental membrane.

It will be remembered that but a few years ago we believed the periosteum built bone, and when William MacEwen published the result of his experiments and proved that the periosteum had no osteogenic function, it seemed that the teaching of years was destroyed. The same may be said regarding the supposition that peridental membrane forms the alveolar process. The process comes from the pre-existing bone which has developed from the osteoblast, which is a special mesoblastic cell.

The peridental membrane is not the life of the alveolar process but serves as the medium of attachment between the tooth and process and between the tooth and gum tissue. The removal of the peridental membrane will open an avenue of infection to the process, but will not necessarily destroy it as some would have us believe.

It is also a general supposition that if the peridental membrane is lost, or if any portion of it is lost, it will never regenerate, or, if a "pocket" develops on the side of a tooth, that it will never again be normal. We are aware of the fact that this is true in a great many instances, but it is not because the histology of the parts teaches us that the peridental membrane will never rebuild. In fact, the case is just the reverse. If the tissue around a tooth can be kept in healthy and normal condition, both the peridental membrane and the alveolar process will regenerate. We arrived at that conclusion several years ago from a study of the parts, but it remained for Hecker to prove it clinically. A great many cases of destruction of both the process and peridental membrane have been investigated, in which the tissues have regenerated and the teeth become normal in regard to attachment.

However, knowing that these tissues rebuild, we would not use that as an excuse for destroying them. We know that people recover from typhoid fever and pneumonia, yet we would not advise anyone to develop these diseases because some may have recovered from them. Therefore, care should be exercised in the use of ligatures and bands so as not to produce needless pain and injury.

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